

## Introduction

At the present time the alliance is facing important changes. These include preparing for a broader range of missions across the full spectrum of military operations, new and extended areas of operation, and new responsibilities in combating terrorism and information operations. To meet the associated requirements, innovative concepts and technologies for an efficient and effective utilization of military forces with limited manning have to be developed. This affects mission training, preparation, execution and after-action review.

In future missions, military operators will have to interact with highly complex C4ISR systems and weapon system designs under high physical, mental, and emotional workload. Therefore the ergonomic design of human-system interaction (HSI) is a critical issue. The involvement of the human operator will remain essential, as military performance will still require the human-in-the-loop.

Virtual Environment technology allows the human operator to perceive and experience sensory contact and interact dynamically with such contact in any or all modalities. In recent years the introduction and development of Virtual Environment technology has grown from its original training focus to current applications which include systems design, mission rehearsal and mission execution. The effectiveness of these applications will be dependent on the extent to which VE meets the needs of human operators.

Augmented, Mixed, and Virtual Environments (AMVE) are focusing on presenting computer-generated, synthetic scenarios in a realistic way. Ideally, the human user should not be able to differ between the synthetic and the real part. He should be able to interact with the synthetic entities as if they were real. Although the baseline idea was formulated decades ago technology has just recently become powerful enough to turn it partially into reality.

Because of the high usability potential of AMVE-systems for a broad variety of applications, a NATO research task group on *Advances of Virtual Environments for Human-System Interaction* has been initialized in 2003 to survey real applications and future potentials of AMVE technology.

This report describes main project, locations and activities in participating nations. It gives a detailed compendium about the State-of-the-Art on AMVE-technology in Canada, Denmark, Germany, The Netherlands, Sweden, the UK, and the US.

