

# Behavioural Representation of People in Contemporary Operating Environments

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## 1 Introduction

1.1 This overview focuses on the UK defence need to improve behavioural representation of people in contemporary operating environments in their modelling and simulation capability in order to provide better pre-deployment training and experimentation, and to enhance analysis for better decision-making. It addresses this need through:

- Making Computer Generated Forces Smarter
- Dynamic Social Modelling to improve our decision making and pre-deployment cultural and social training.

## 2 Making Computer Generated Forces Smarter

2.1 The Integrated Human Behaviour Representation (IHBR) programme which was initiated in 2003 seeks to improve the realism and available variability of both Computer Generated Forces (CGF) cognition and behaviour. The initial phase (2003-2005) of the programme explored a means for explicitly differentiating CGF entity '*cognition*' from entity '*behaviour*' and improving CGF entity and unit cognition. The second phase (2006-2008) explored ways of making these improvements in realism and variability of cognition more available to and realisable in the behaviour generation capabilities of legacy, current, and developing CGF systems.

2.2 Given the level of investment in the IHBR programme, and its importance to future CGF application development, the follow-on work will examine and demonstrate how people within Contemporary Operating Environments (COE)<sup>1</sup> can be represented in CGF systems by invoking more realistic, flexible and variable ('smart') behaviours.

2.3 The work will address how to represent all types of people in current and anticipated operational theatres within simulation environments. It

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<sup>1</sup> A complex overall operational environment with state and non-state players that exists today and in the near future in conflicts of interest, security or war.

is to consider a broad range of factors, including behavioural reasoning, physiological and psychological representation, cultural and societal influencers, and specific threat representations. The demonstration objective is to integrate and assess a comprehensive cognitive system for the purpose of representing all types of people in the COE.

#### 2.4 Specifically the work will:

- Identify and qualitatively evaluate existing and emerging behavioural techniques against defined attributes that would be applicable for representing people in current and anticipated operations, either within CGF systems (e.g. JSAF *ClutterSim* or *CultureSim*, OneSAF *composable-behaviour*, etc), or available as “plug-ins” to other simulation tools (e.g. B-HAVE plug in for VR Forces, AI Implant, CoJACK2, etc)
- Explore the *composable-behaviour* mechanisms available within OneSAF, and demonstrate OneSAF’s ability to represent civilians and insurgents in current COE
- Identify and qualitatively evaluate available Belief, Desire, Intent (BDI) cognitive platforms or architectures (GOTS<sup>2</sup>, COTS<sup>3</sup> open source or freeware), and select and demonstrate the architecture that is most beneficial
- Develop an initial ontology for a couple of CGFs to demonstrate how the same BDI agent plan library can be re-used to drive behaviour in CGFs with very different behaviour repertoires (e.g. VBS2 and OneSAF)
- Demonstrate the ability to integrate smart behaviours in VBS2, initially enabling the expression of subtle, important, culturally-dependent, non-verbal behaviours (including body language) of civilians and insurgents.

### 3 Dynamic Social Modelling

- 3.1 UK is currently developing a research strategy to support Dynamic Social Modelling (DSM) in order to improve cultural and social representation for better decision making and pre-deployment training.

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<sup>2</sup> Government-Off-The-Shelf

<sup>3</sup> Commercial-Off-The-Shelf

- 3.2 The DSM term is used to describe all software modelling approaches that include social factors. DSM approaches may be incorporated into existing models and simulations or provide stand-alone capabilities to address specific social issues.
- 3.3 A series of workshops and roadmapping exercise were conducted to define the scope of DSM and its relevance and need to support COE.
- 3.4 The output of the workshop recommended a number near term and long term challenges and the strategy for developing and exploiting DSM capability.
- 3.5 The short term requirements identified were for:
  - Operational quick-wins for socio-cultural training and education
  - Development of deployable social factors operational analysis capability.
- 3.6 The long term requirements identified were for a DSM capability comprising a suite of compatible or integrated methods and models that address the full range of effects and cover both military and non-military levers of power. These models would ensure that defence functions are more financially efficient and more effective, through supporting:
  - Training and education
  - Course of action development
  - Policy development
  - Balance of investment decisions.
- 3.7 The strategy to develop and exploit the DSM capability includes the following enablers:
  - Build customer and stakeholder awareness and ownership of DSM
  - Conduct a near-term stocktake of DSM capability
  - Develop internal and external supply base for DSM
  - Ensure availability of data for DSM
  - Establish practical guidance for fit-for-purpose use of DSM
  - Relate DSM developments to COE developments.

## **4 Concluding Remarks**

- 4.1 The key challenge for behavioural representation in COE is timeliness. The methods for human representation in defence models and simulations need to be agile and responsive if they are to be relevant

to COE. Furthermore, they will need to include complex cultural and social dynamic representation.