Development of CBRN Impact Assessment Capabilities

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Introduction

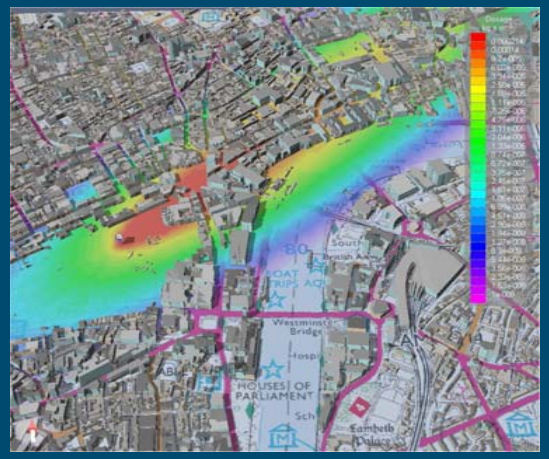
- Impact assessment studies provide a valuable insight into the effectiveness of defensive equipment and procedures with respect to causalities and effects on operations.
- They provide the capability to assess the level of casualties when faced with a CBRN incident and evaluate the effect on the operation.
- There are benefits to be gained from CBRN impact assessment studies therefore the requirement to develop tools to support them exists. So how do we do it ?

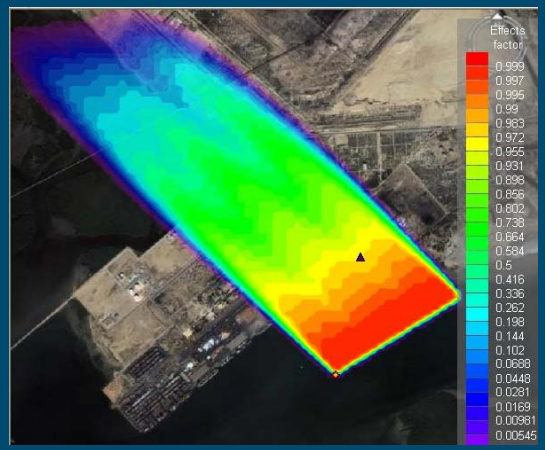
Introduction Cont.

- Tools, such as JOEF and the MOD's Virtual Battlespace, can be used to
  - support the equipment acquisition programme
  - aid pre-operational planning
  - assess the operational implications of concepts, doctrine and technology development
  - guide the research programme
  - aid CBRN training

Developing Dstl's Capability

- As part of the UK MoD's strategy Dstl has developed a chemical and biological defence operations research tool, called the Virtual Battlespace (VB).
- The VB allows the user to create scenarios for analysis and vary parameters, based on statistical distribution and Monte Carlo sampling.
- The VB is currently being used under two programs of work for the JSTO. The 'Impact Assessment Tool' and 'CBRN in Theatre and Tactical Level Simulations'.





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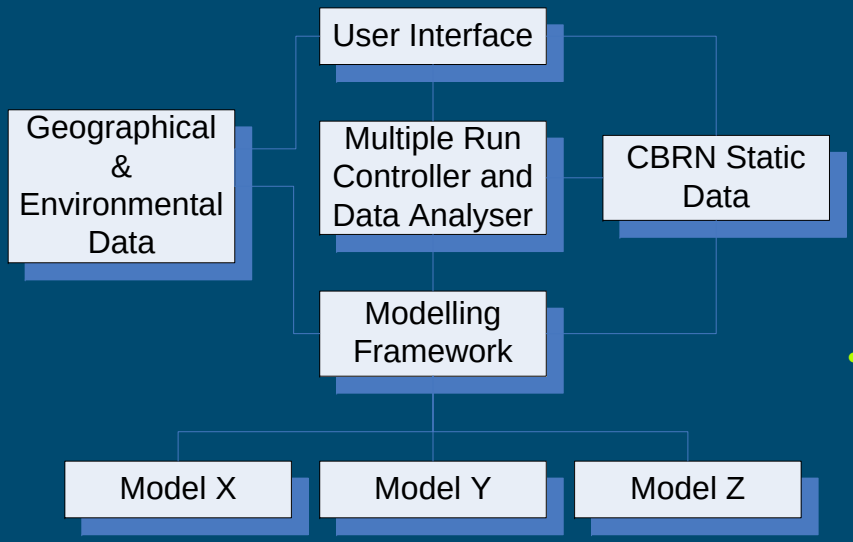
What is the Virtual Battlespace?

- A synthetic environment including (some under development)
  - State-of-the-art dispersion models (UDM & SCIPUFF)
  - Models of CBR defence system (detection, protection, MCMs)
  - Representation of movement of entities (aircraft, army units)
  - Links to combat & facility models (WISE, OneSAF, STAFFS)
  - Multiple run controller
  - Wargaming mode

The Virtual Battlespace Models

- Dispersion Modelling
  - CBR sources and hazard plumes (weapons, IEDs, RDDs, TICs & TIMs)
  - Urban and Rural (SCIPuff & UDM)
  - Concentration Realisation
- Meteorology
  - Terrain
  - Local Wind Turbulence
  - Sea Breeze



- Military Units/Personnel
  - Effects (casualties)
  - Inhalation & Contact Hazard (liquid pickup)
  - Medical Countermeasures
  - IPE
  - Physiological Burden
  - Aggregation
  - Value of Information
- Detectors
  - Simple (threshold)
  - Generic
  - Specific
  - Standoff
  - Biological Background
  - Single & Network Alarms
- Modes of Use
  - Wargaming
  - Assessment

Operational Effects

- The Virtual Battlespace predicts the impact of CBRN on personnel, equipment and terrain
- In general, this will be done by linking or inputting to appropriate high-level modelling tools
  - This can include both simulations and wargames
  - Physical link was investigated to UK WISE (formation level simulation)

The Challenge

- An issue with CBRN Impact Assessment lies with the level of fidelity the user wishes to run the model at. It is not feasible to run every scenario at a high level of detail down to individual units.
- One way to overcome this is to link a CB effects model with event based models. E.g. STAFFS, Combat 21, and OneSaf to provide CB effects at the models native level of detail.
- This approach provides more accurate representations, but the inherent challenge becomes the methodology by which the effects can be aggregated between the different levels of models in use to provide the overall CBRN Impact Assessment Capability.

CBRN in Tactical and Theatre Level Simulation (II.B.2(c) Bullets 1 & 2)

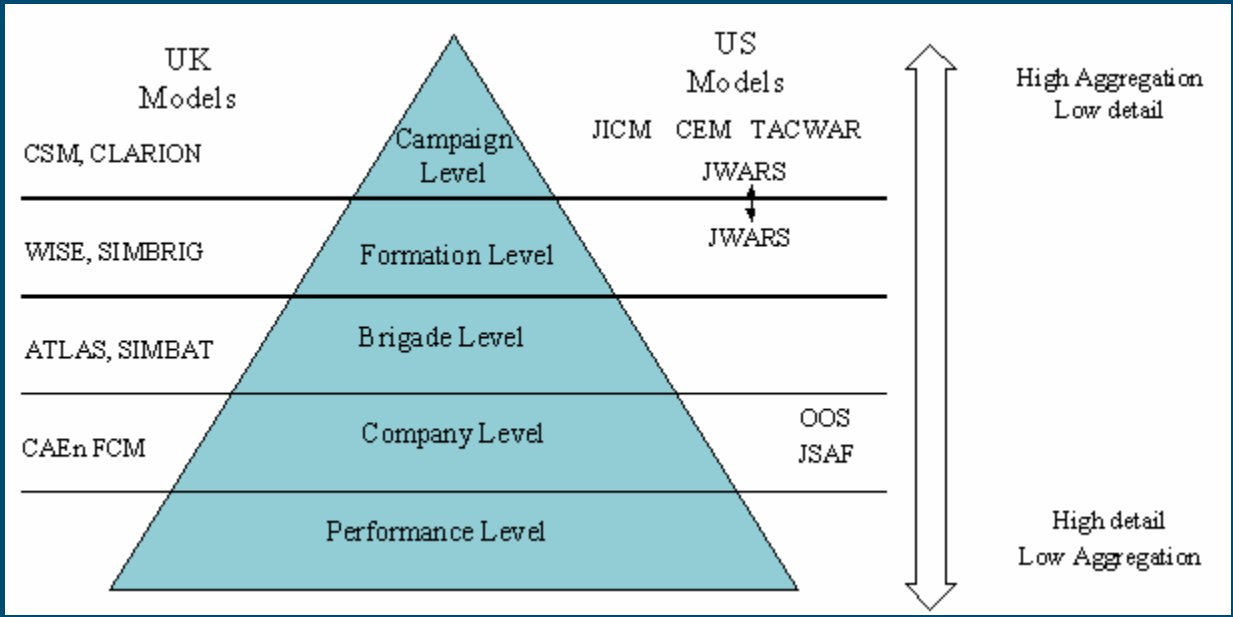
Introduction

- JSTO funded work targeted at the JOEF program of record.
- Work to take place over 4 years.
- The aim of this work is to provide a capability for carrying out assessment studies for mobile forces, which supports several levels of aggregation and links to existing theatre/tactical models.

Background

- It is a military aim to have the ability to maintain political and military freedom of operations in the presence or threat of CBRN weapons.
- Warfare simulations exist at various levels of detail. Each could have its own CBRN effects.
- A more pragmatic solution is to have one effects model and apply it to all levels of simulation systems.

Example of simulation levels



Many of these existing simulations do not contain a representation of CBRN, others only contain a simplistic representation.

Military Significance

In order to achieve political and military freedom of operation it is necessary to quantify the effects of CBRN on mobile forces in terms of:

- Causalities
- Decreased operational Effectiveness
- Command and Control structures.

In Theatre or Campaign level engagements effects that need to be quantified are :

- The effect on the outcome of the campaign
- The effect on the duration of the campaign
- The effect on casualty levels (are they acceptable?)

Military Significance (2)

This tool could be used to provide capability in the following areas :

- Planning and Risk Assessment/Management

At a preoperation stage where the effects on a proposed operation can be quantified in terms of operational effectiveness and collateral damage.

- Doctrine Development

The tool could allow the analysis of different CBRN doctrine decisions. For example at what point individuals react to detector alarms. The effect of these decisions could be quantified providing important information to doctrine developers.

Work Breakdown

Year 1

- Conduct a study of existing tactical and theatre level warfare simulation models. The objective being to select one of each for future integration.
- Develop an aggregation strategy and implement it within Dstl's existing CBRN modelling and operational research system.

Year 2

- Begin integration of CBRN effects with the chosen tactical model.

Year 3

- Finish integration with tactical model, begin integration with theatre level model.

Year 4

- Complete integration with theatre model and provide a software and documentation release.

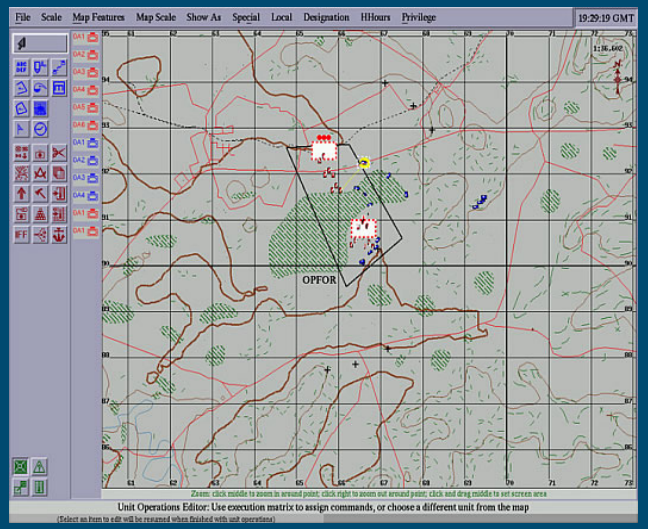
Models

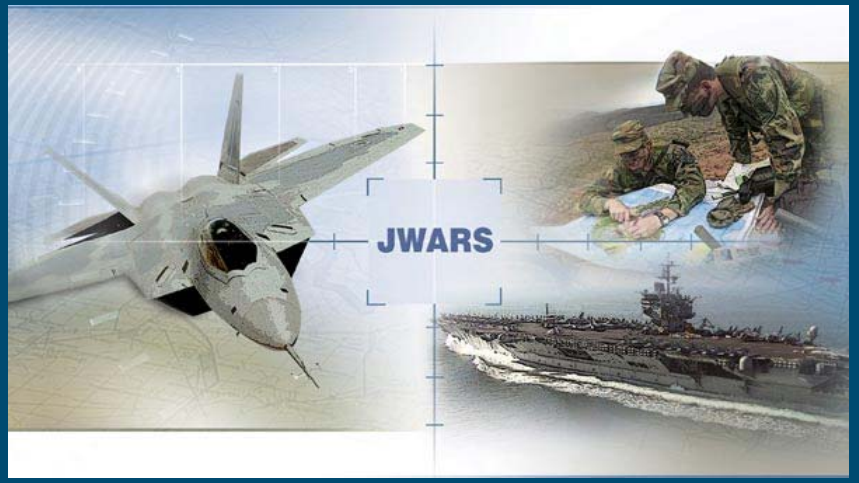
Tactical

- OneSAF / JSAF
- Combat 21
- AMP (Analysis Mobility Platform)

Theatre

- JWARS
- JICM
- TACWAR





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The Challenge

- Thoroughly assess the model candidates to link with
- Develop appropriate aggregation and disaggregation approaches
- Ensure the overall system can be run in an acceptable time
- Remain focused on the benefits and relevance to the development of future increments of JOEF.

Questions ?