

Evolving Porton Man

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Overview

- Introduction
- Old Porton Man
- New Porton Man
 - Design and Manufacture
- Real-time sensing
- Impact
- Summary

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Dstl Overview

Purpose and role

To maximise the impact of science and technology for UK defence and security.



Our role



Supply sensitive and specialist services



Provide advice, analysis and assurance



Lead formulation, design and delivery of research programme



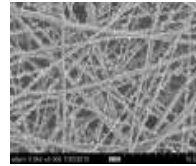
Manage and exploit knowledge



Act as a trusted interface



Champion and develop S&T skills



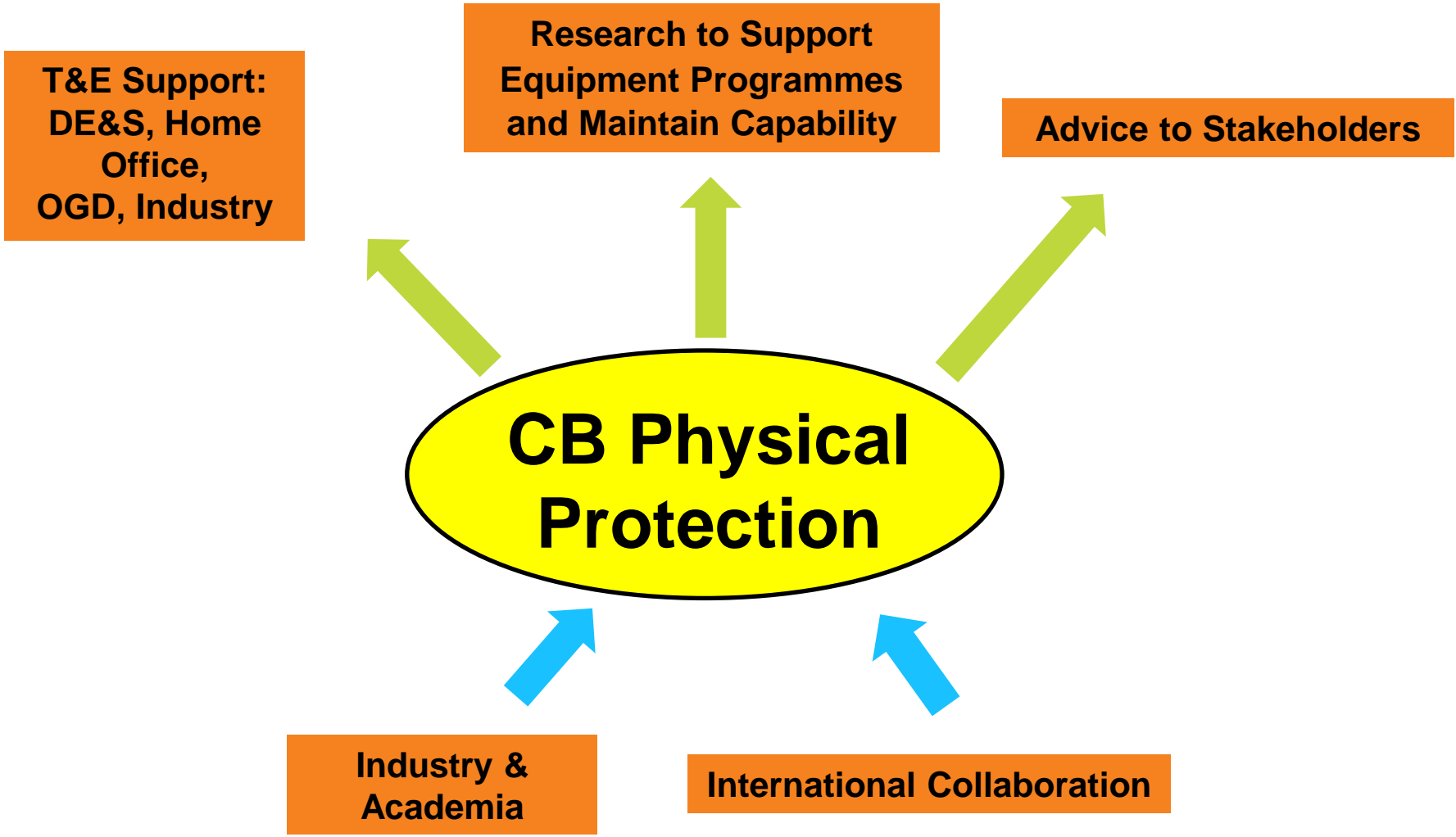
Dermal Protection

CB Physical Protection

Respiratory Protection

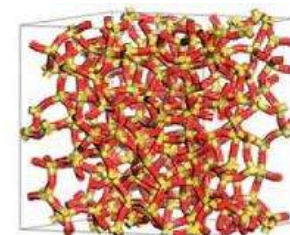
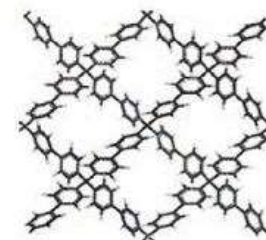
COLPRO





CB Physical Protection

- Provide understanding of the performance and integration of CBR protective systems and equipment
- Assessment focused
 - Ability to work with CW agents
 - Field trialling (using simulants)
- Technical “eyes and ears” for MoD
 - Identifying and assessing new technologies / concepts for lowering burden
 - Advising on potential risks and issues on the horizon
- Problem solving



Respiratory Protection – Field Test





Protective Clothing

Chemical and Biological Physical Protection

- Focus is on assessment
 - Underpinned by the ability to work with Chemical Warfare (CW) agents



Overview

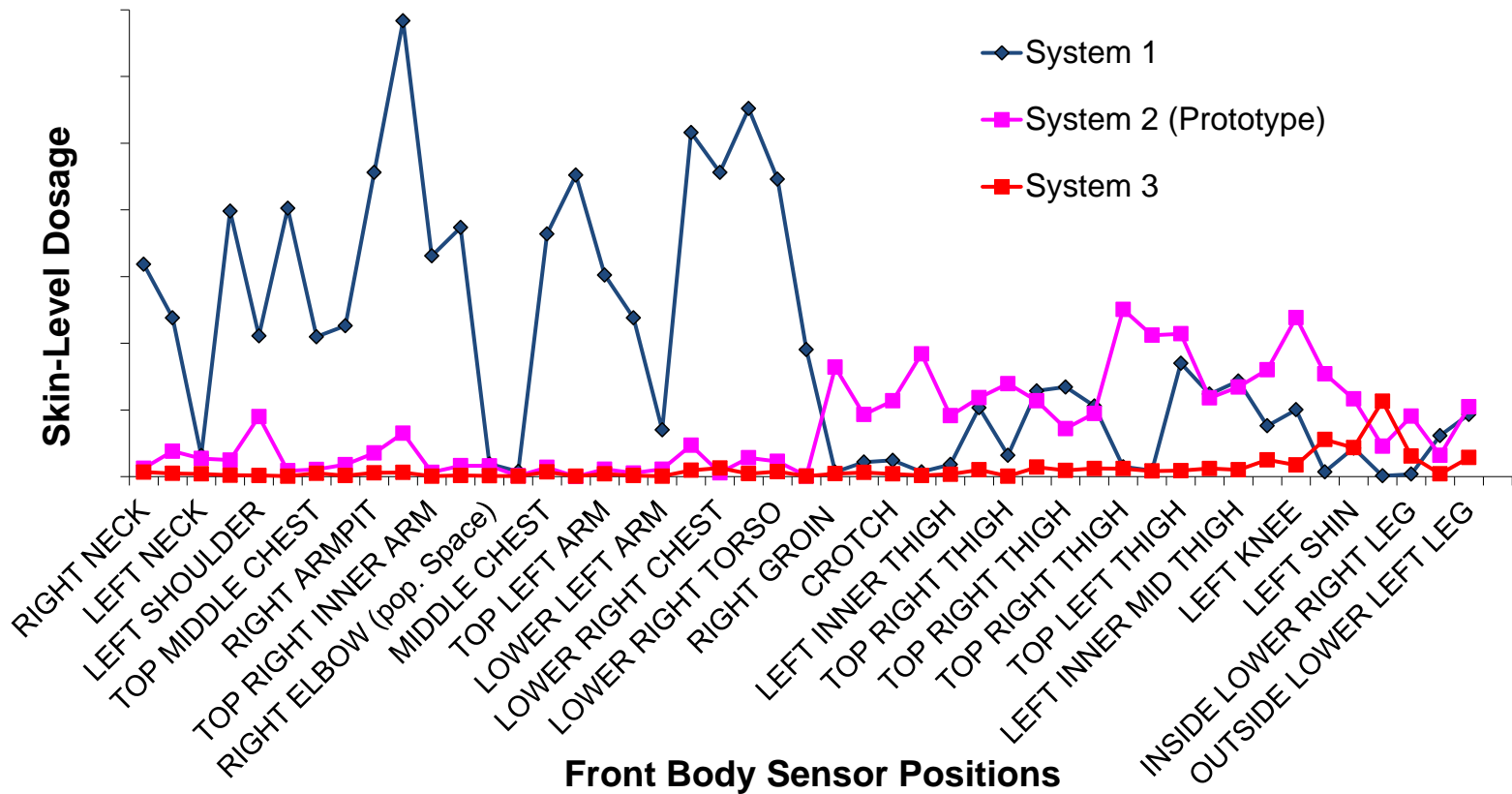
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Old Porton Man

- The 'Porton Man' mannequin is used to quantify the performance of Chemical and Biological (CB) protective clothing
- Currently, the only Full-System Test (FST) method that can employ a live chemical agent challenge



Full-system test results



Porton Man limitations

- Widely used but aging capability
 - Prone to breakdown
- Limited movement
 - Exaggerated marching only
 - No head movement
- Mannequin only faces one direction against incident wind during exposure
- Mannequin requires specialist lifting equipment to remove from the frame to enable dressing



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New Porton Man

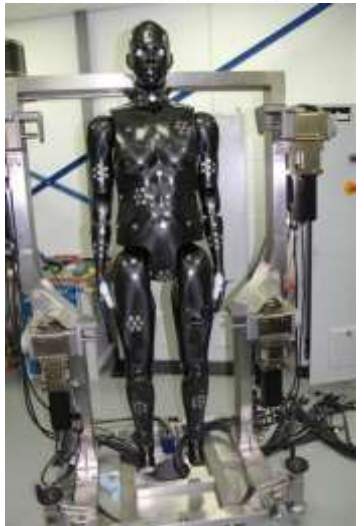
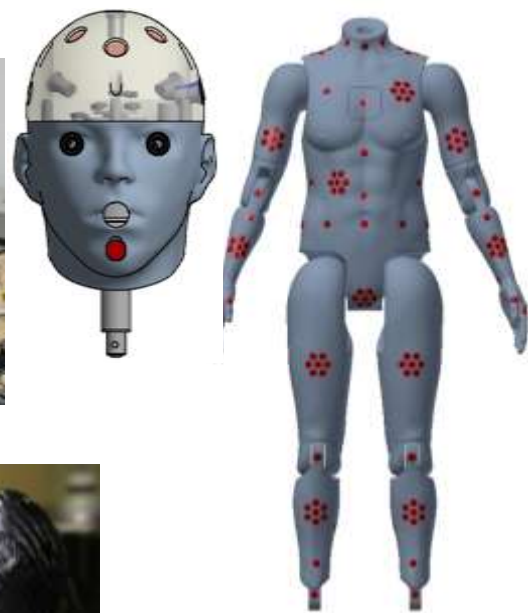
- Opportunity to enhance capability and provide customer an improved Test and Evaluation (T&E) facility
- Complete mannequin test process
 - Mannequin
 - Passive and real-time sensing
 - Temporal information on skin-level dosages
 - Data storage and presentation
- Competitive tender process
 - i-bodi Technology Ltd. successful



Design - specification

- Increased range of movement
 - Walking to running
 - Marching
 - Kneeling (to sight a weapon)
 - Sitting
- Independent head movement
 - Attachment at the top of the back
- Detachable breathing machine
- Turntable
- Lightweight (easy to operate)
- No feet attachment and quick release hands
- Latest anthropometric military survey
- **Real-time sensing**





Delivery



- Mannequin delivered March 2014
- Commissioning stage underway



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Real-time sensing

- Passive sensing method limitations include:
 - Resource intensive (time/cost)
 - Only the cumulative mass recorded hence only cumulative dose is known
 - Sampling is not real-time



- The benefits of sampling in real-time include:
 - Temporal information on skin-level dosages
 - Concentration – time profiles
 - Understand factors affecting penetration

Evaluation of candidate real-time sensing technologies



Optical reflectance sensors

(Catapult Innovations and Australian Government)



Metal oxide sensors

(Environics)



μ RAID

(Bruker Daltonics)



Chemical Detector Modules (CDM)

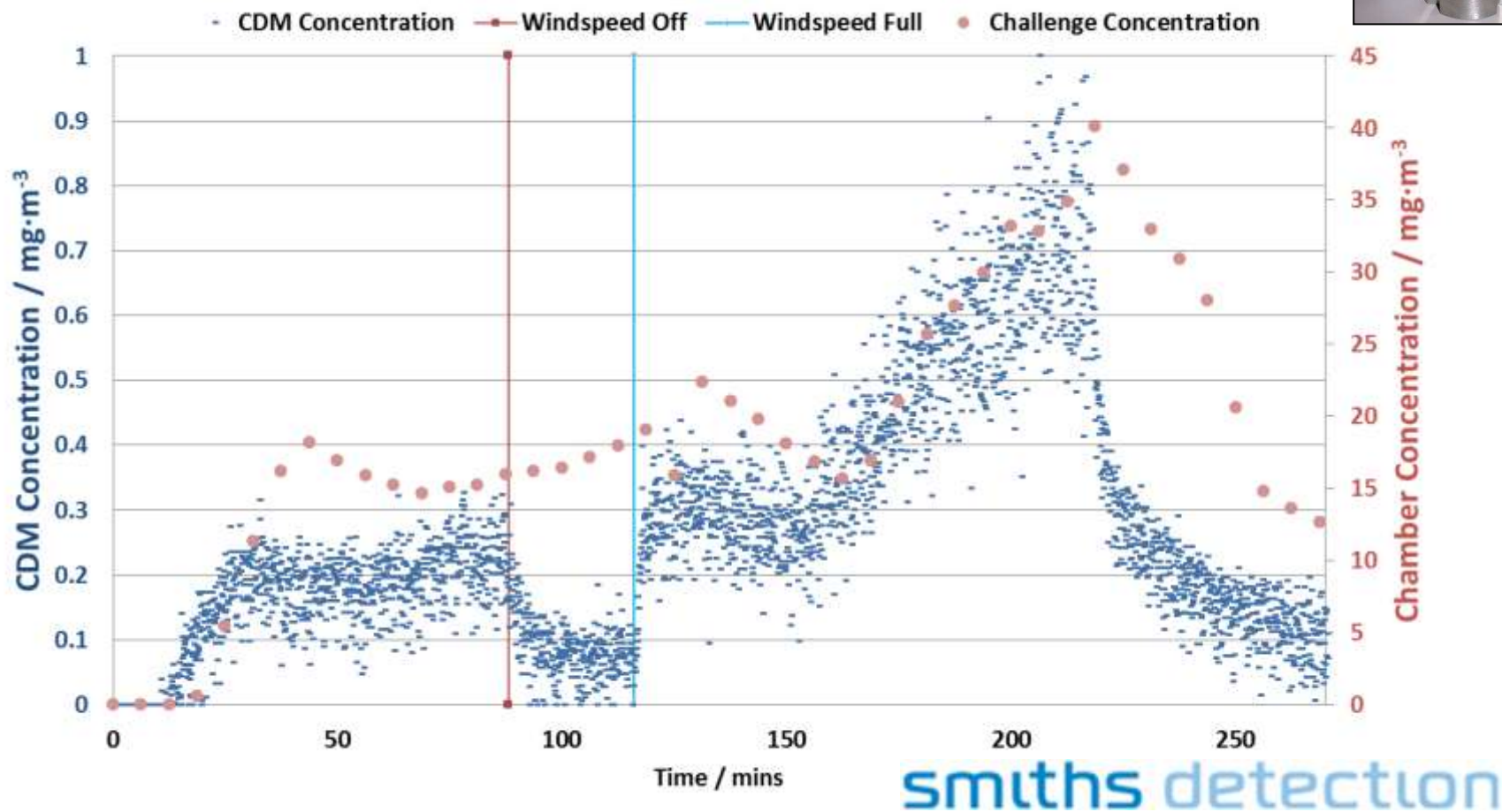
(Smiths Detection, US Government)

Real-time sensing

- CDMs (*Smiths Detection, US Government*)
 - Ion Mobility spectrometry
 - Based on Lightweight Chemical Agent Detector 3.2
 - Sensitive, Specific
 - Small space form (60 (d) x 60 (l) mm, 200 g)
 - Skin-level attachment capability within cavity



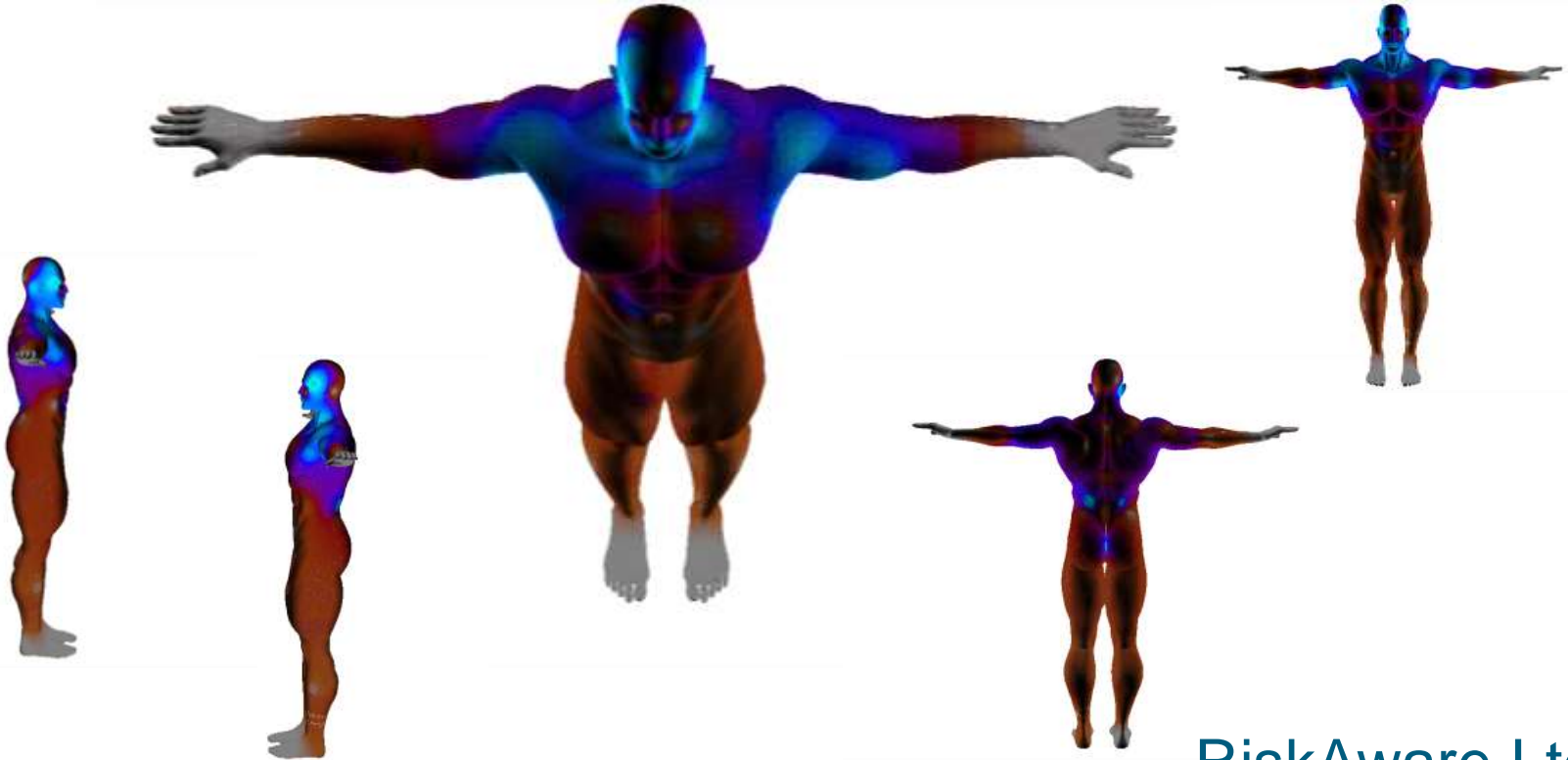
Chamber vs underneath suit concentration



- First known report of wireless transmission of skin-level sulphur mustard (HD) concentrations underneath a CB protective suit

Data Presentation

- Data Storage and Presentation (BodyMap Software)
 - Easier way to collate, visualise and compare Full-System Test data



RiskAware Ltd.

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Impact

- Provide rigorous test and evaluation capability to ensure Personal Protective Equipment (PPE) is fit for purpose
 - Provide increased end user confidence in PPE
- Inform and support future clothing acquisition programmes
 - DE&S SONORIC Tier 1 and 2 programme
 - Aircrew Protection Equipment and Detection (APED)
- Provide timely, detailed assessments for Other Government Departments and commercial sources

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- New Porton Man mannequin delivered to Dstl to specification
- Real-time sensing technique down selected and mannequin designed to accommodate these
 - First known report of wireless transmission of skin-level HD concentrations underneath a CB protective suit
- Research programme successfully bid for FY14/15 to FY 17/18 to develop protocols for land and air based clothing systems