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Subject Area	Title	Description	Available to Download from HFI DTC Website
Command & Control	A Review of the Event Analysis of Systemic Teamwork Methodology	This report describes a review of the Event Analysis for Systemic Teamwork (EAST) methodology that was used to analyse C4i activity in the rail, air traffic control, energy distribution, military, police, fire service and naval domains. The EAST methodology was specifically designed for the analysis of collaborative activity complex socio-technical systems. The methods review indicated that the EAST methodology is an exhaustive technique that is particularly suited to the analysis of C4i, team-based and collaborative activity.	Yes
Command & Control	An Exploratory Study into Remote and Co-Located Command Planning	This report is about an experimental study into distributed teams that ran in the latter part of 2006. It is a collaboration between the Human Factors Integration Defence Technology Centre (HFI DTC) and the Ministry of Defence Directorate of Command, Control and Information Infrastructure (DEC CCII). The practical question that this report aims to address is: "how does the military commander keep involved in the planning process when they are remote from it?"	Yes
Command & Control	Application of the Event Analysis of Systemic Teamwork (EAST) Method to Army Land Warfare Command and Control	This report applies the DTC's EAST method in order to provide an evaluation of military Command and Control (C2) from a human perspective. The application of EAST described in this report represents the first such analyses conducted in the military arena. The report's aim is to look at how EAST might contribute and assist with the analysis of military C2.	
Command & Control	E3D Operations Report	This report describes a study that was conducted in order to analyse C4I in the Royal Air Force. Access was granted to allow observers on board an AWACS (Airborne Warning and Control System) aircraft during a two week period. The report uses the Event Analysis for Systemic Teamwork (EAST) methodology to explore a complex communication system between eighteen team members and external agencies.	
Command & Control	EAST Methodology for Air Traffic Control Report	The EAST methodology is used to derive results from five air traffic control scenarios observed live. The results of the individual EAST analysis methods provide multiple perspectives on key Command & Control, Communications, Computers and Intelligence (C4I) constructs. The findings highlight the structure of the controller's task, where it is broken down into manageable analysis units based upon the transit of individual aircraft through a radar sector. Success relies on two-way communication, decision-making and coordination involving human and non-human agents, where a complex and distributed communication network is in place.	Yes
Command & Control	EAST Methodology for Railway Data: Protection Scenario	This report uses the EAST methodology to present results and analysis of a relatively simple scenario drawn from the Railway industry. The scenario involves two distributed parties engaged in the task of detaching a train.	Yes
Command & Control	Exploratory Study using Sociotechnical Theory for NEC System Design	The report is about how best to exploit human adaptability in the Network Enabled Capability (NEC) era. The report examines the processes by which human adaptability takes place under conditions of 'Classic Command and Control (C2)' compared to NEC.	
Command & Control	Field Studies at HMS Dryad	This report describes a study that was conducted in order to analyse C4I in the Royal Navy domain. Researchers were given access to one of their training establishments - the Maritime Warfare School - HMS Dryad. The report uses the EAST methodology to explore a complex communication system between sixteen team members.	
Command & Control	Field Studies in the Emergency Services	In this report, C4 processes are explored in the emergency services. Specifically, access has been granted to allow study of Police and Fire service operations. The aims of the work were to apply the methods developed under the HFI DTC Command and Control work package, to collect data pertaining to these services and to explore the ways in which different command structures operate.	Yes
Command & Control	Forms of Network Representation for Network Enabled Capability: Human Factors interpretation of Network Representations	In this report a primary goal is to consider approaches to representing networks with a view to drawing analogies between the representations used by communications and computer networks engineering and Human Factors Engineering.	Yes
Command & Control	Generalising from Novices to Experts in Military Studies	This report completes a suite of papers delivered during 2006 that were concerned with design issues as they related to so-called 'Command Wall systems'. This report is about whether the results gained from novices in previous studies can be generalised to an expert (i.e. military) population.	Yes
Command & Control	Generic Process Model of C4I Activities	The purpose of this work package was to produce a generic model or framework for understanding and analysing modern C4ISR, primarily from a human perspective. The process model in this report was derived from a range of resources. From this analysis, taxonomies of command and control activities are developed to give rise to an activities-based model which will be used to guide further research into technological support of C4ISR activities.	Yes
Command & Control	Gold Command Wall Evaluation: EAST Analysis of Electronic, Radio and Paper Methods of Command and Control	The aim of this study was to evaluate the Brunel command wall system based on a comparison with existing 'paper' and 'radio' methods of command and control. Each command system was used to conduct a battlespace area evaluation scenario, the EAST approach was then used to analyse network performance. It was concluded that the command wall system offered the most support to the agents involved and was the most efficient of the three tested when used to perform the battlespace area evaluation scenario.	Yes
Command & Control	Measuring Situation Awareness during Command and Control Activity: A Comparison of Measures Study	The level of Situation Awareness (SA) that systems and devices provide to individuals and teams is a critical factor that needs assessing throughout the design process. There are various methods available for assessing SA, yet there is little guidance available on which of these methods are the most valid, reliable and accurate. The purpose of this study was to compare three existing SA measures when used to measure participant SA during a command and control experiment.	Yes
Command & Control	Report on C4I Study: Brunel Command Wall System Design Recommendations	Report on the design recommendations for the C4I Brunel Command Wall System as at March 2006. The aim of this report was to extract and summarise any improvements to the Brunel Command Wall System, and to describe the empirically derived responses to the limitations identified in the previous studies.	Yes

HFI DTC Deliverables

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Command & Control	Report on C4I Study: Command Wall System versus Conventional Paper and Radio Based Techniques	A study of three C4I techniques; command wall technique (electronic), embodied by the Brunel command wall system, compared to a traditional paper map technique (paper) and a traditional radio and map technique (radio). The aim of this study was to identify any significant differences between the three systems, and any improvements that could be made, from a user perspective, to the new electronic C4I system.	Yes
Command & Control	Report on C4I Study: Using an Electronic C4I system to examine the effects of Information Source and Decay	This report analyses the effects of information source type and information permanence. The results suggest that any effect of information source type and decay is largely confined to time, accuracy and SA.	Yes
Command & Control	Report on Results of WP1.1 EAST Methodology for Railway Data: Emergency Possession Scenario	This report uses the EAST methodology to present results and analysis of a scenario drawn from the Railway industry. The scenario involves multiple distributed parties engaged in the task of setting up a 'possession' for a stretch of track in order that emergency engineering works can take place.	Yes
Command & Control	Report on Results of WP1.1 EAST Methodology for Railway Data: Hand Back Possession Scenario	This report uses the EAST methodology to present results and analysis of a scenario drawn from the Railway industry. The scenario involves multiple distributed parties engaged in the task of handing back a 'possession' for a stretch of track previously taken for the purposes of engineering work.	Yes
Command & Control	Report on Results of WP1.1 EAST Methodology for Railway Data: Possession Scenario	This report uses the EAST methodology to present results and analysis of a scenario drawn from the Railway industry. The scenario involves multiple distributed parties engaged in the task of setting up an engineering possession on a stretch of track.	Yes
Command & Control	Silver Command Acceleration: Report on Laboratory and Field Studies	This report describes work developing and testing an intermediate level Command System in respect of a range of mini studies. These were carried out in parallel to the requirements specification and design of a Modified Off The Shelf (MOTS) Silver Command solution.	Yes
Command & Control	Specification for a Reconfigurable C4 Test-bed for Experimental Studies into Network Enable Capability	This document details the system requirements for the C4I test bed at Brunel University. A model of Command and Control was used to develop a Cognitive Work Analysis model for generic Command and Control. From this, and by examination of the combat estimate and current uses of military symbology, a system specification has been developed for a Reconfigurable C4 Test-bed for Experimental Studies into Network Enable Capability.	
Command & Control	System Performance Requirements Established from a Taxonomy for Command and Control	This details the requirements elicited from the taxonomy of command and control developed by Stanton et al. These are focused on a goal based analysis of the steps a commander would need to take in carrying out a mission.	Yes
Command & Control	Updated version of WESTT now at Version 3.31. Delivered with User manual	In order to explore the potential impact of novel command and control configurations, it is useful to have some means of extrapolating from existing systems and comparing the outcome of change from existing to novel systems. By taking a 'systems' view of operations, it is possible to consider the impact of reconfiguration upon the performance of the system and upon the agents operating within the system. The aim of the WESTT (Workload, Error, Situational Awareness, Time and Teamwork) analytical prototyping tool is to support systems analysis and to allow the analyst to explore the impact of reconfiguration through the manipulation of models.	
Command & Control	Using Sociotechnical Theory to Explore the Organisational and Structural Foundations of NEC	The focus of the study is on to exploit human adaptability in the NEC era, in other words, how to create the conditions in which to "leverage a disproportionate effect from a given action" (Smith, 2006, p. 84). To that end, the analysis is couched in the processes by which individuals and teams adapt themselves, and technology, to four different levels of environmental complexity under two different organisational design paradigms. The question is which type of organisation, so-called Classic C2 or NEC, creates the optimum initial conditions from which to exploit human adaptability in a simulated military context and, specifically, under what conditions of environmental complexity. The main conclusions are that NEC has the potential to improve performance but that a concomitant shift in thinking is required in order to yield this outcome. The focus shifts from technical optimisation to the sociotechnical principle of joint optimisation, from complex organisations 'doing' simple tasks (i.e. C2) to instead simple organisations 'doing' complex tasks (i.e. NEC). Furthermore, there is the idea of 'setting for success' (a non-linear approach) rather than strictly specifying how that success is to be achieved. Sociotechnical theory has much to offer in all these regards and the aim of this paper is to use these principles to turn sociotechnical theory into practice.	Yes
Command & Control	A Review of Sociotechnical Systems Theory: A Classic Concept for New Command and Control Paradigms	Although developed independently, NEC exhibits a high degree of overlap with concepts derived from sociotechnical systems theory, a fact that this research paper, derived from an extensive literature review, aims to explore more fully. The paper reviews the twin concepts of NEC and sociotechnical systems theory, the underlying motivation behind the adoption of open systems thinking, a review of classic sociotechnical studies and the current state of the art. It is argued that 'classic' sociotechnical systems theory has much to offer 'new' command and control paradigms, in particular, a successful fifty year legacy in the application of open systems principles to commercial organisations.	Yes
Command & Control	Application of WESTT to System Redesign	The motivation for this work arises from the problems of aligning Human Factors with Systems Engineering. A perennial issue relates to the difficulty of incorporating Human Factors design recommendations into an appropriate Systems Engineering framework. By demonstrating, through two case studies, the manner in which the HFI DTC's Workload, Error, Situational awareness, Time and Teamwork (WESTT) tool can be used to both inform the design of a user interface (and some of the underlying functionality) and to consider the impact of alternative communications systems on a command structure, the report provides guidance on how Human Factors can be incorporated with initial stages of Systems Engineering.	Yes
Command & Control	Human Performance Under Two Different Command and Control Paradigms	The paradoxical behaviour of a Network Enabled Capability (NEC) provides the motivation for this paper. In it, a traditional hierarchical command and control organisation was pitted against a network centric alternative on a common task, played thirty times, by two teams. Multiple regression was used to undertake a simple form of time series analysis which revealed that whilst the NEC condition ended up being slightly slower than its hierarchical counterpart, it was able to balance and optimize all three of the performance variables measured (task time, enemies neutralized and attrition). From this it is argued that a useful conceptual response is not to consider NEC as an end product comprised of networked computers and standard operating procedures, nor to regard the human system interaction as inherently stable, but rather to view it as a set of initial conditions from which the most adaptable component of all can be harnessed: the human.	Yes

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Command & Control	Social Network Analysis, Team Cohesion and Meaningfulness of Tasks: A Comparison Between Two Different Command and Control Paradigms	Two teams undertook 30 iterations of a complex, high tempo scenario under two different command and control conditions: Network Enabled Capability (NEC) and a traditional hierarchical counterpart. The object of the study was to use a simple time series analysis to test the assumption that structural determinates of NEC (such as peer-to-peer working) lead to corresponding improvements in the meaningfulness of tasks for the human incumbents. The results of a social network analysis show that the NEC condition facilitated more communications and informationally richer ones too. There was also structural evidence to suggest the presence of elevated levels of internal leadership and autonomy. The main finding was that this translated into a subjective experience of the same, as measured by a simple self-report team cohesion scale. The current study provides an empirical basis to support one of the central assumptions driving forward the implementation of NEC.	Yes
Command & Control	Course of Action Visualisation Development	The Ministry of Defence Directorate of Command, Control and Information Infrastructure (DEC CCII) posed the following research question to the Human Factors Integration Defence Technology Centre: "Advice is sought on the most applicable method/s of presenting Course of Action (CoA) information to the Operational and Strategic command chain to enable effective decision making by understanding alternative solutions and related risks. This will inform applications development of future Situational Awareness Capabilities including FCP [Future Capability Program] and upgrades to ComBAT."  This report presents the findings of a study conducted in response to this question. The report has provided a context for the problem, suggested a number of possible interface design solutions, and provided experimentally valid conclusions based on a statistically significant analysis of performance data from experimental use of the displays. These differences are then used to extrapolate generic design recommendations for the development of future displays.	
Command & Control	Applying the Study of Complexity to Ergonomics and NEC	The current report distils the concept of complexity through three overlapping themes: 1) the attribute view, which leads to a multi-dimensional problem space through which ergonomics is travelling, 2) the complex theoretic view, in which metrics and measures exist to complement established ergonomics methods and diagnose at least certain aspects of complexity, and 3) the complex systems research view. In this report, key concepts such as emergence, sensitive dependence on initial conditions and dynamical system behaviour are illustrated with reference to ergonomic case studies in command and control. The key issue is that a major source of, and solution to the challenges of complexity derives from the most adaptable component of all in complex systems: the human.	Yes
Command & Control	Beyond NEC	The concept of an 'Edge Organization' is a vision of Network Enabled Capability (NEC) as a fully interconnected web of agents and actors. This concept represents a theoretical maximum and real-life NEC is thought to adopt a variety of different architectures. This report is about exploring exactly what NEC topologies do arise in practice, and what they mean. The HFI DTC has already extended the NATO approach space in order to help answer questions such as these and an opportunity arises to use it to benchmark a live example of NEC. A diverse collection of organizations, from theoretical archetypes to terrorist networks, was also modelled with social network analysis, and their positions within the enhanced NATO approach space fixed. What emerged was a distinct region of the space into which many organizations, NEC included, tended to gravitate. This region is associated with the attributes of 'small world networks'. It is discovered that sociotechnical systems theory is a way to design C2 in order to make them exhibit these attributes. This work contributes to the goals of TLCM, of communicating the complex behaviour of NEC systems and an easy way to visualise the impact that some defined change has had upon C2.	Yes
Command & Control	From Clansman to ComBAT: HFI Principles for NEC System Design	An ever expanding array of military equipment has the facility to have things added in and plugged on, its firmware upgraded and as yet un-thought of future capability supported. Under the aegis of NEC, more and more equipment can be connected to something and/or someone and is thus slowly adapting to the current day state of modernity labelled 'the information age'. This brings with it profound changes in the way that equipment should be designed and thought about. The purpose of this article is to help designers and procurers alike to get a grip on what this might mean in practical terms via a set of explicit design principles, backed up with comprehensive theoretical background drawn from sociotechnical systems theory	Yes
Command & Control	Identifying Information Requirements for Work Aid Design	Ensuring that technological work aids such as knowledge wall displays and digitised mission support systems deliver the right information, at the right time, in the right format, to the right workers is of paramount importance, and yet, valid, theoretically underpinned, approaches for identifying the range of user information requirements within complex collaborative systems are scarce. The purpose of this research was to propose a structured, valid and theoretically underpinned methodology for identifying distributed situation awareness requirements (or information requirements) in complex collaborative systems. This report presents an overview of the methodology, including guidance for practitioners wishing to apply the method, and a case study demonstrating its application. In closing, the implications of distributed situation awareness theory for information requirements in complex collaborative systems are discussed.	Yes
Command & Control	Using the Decision-Ladder to add a Formative Element to Naturalistic Decision Making Research	The primary reason for the approach developed and described in this report, is in direct response to the complexity of the sociotechnical domains that typify military systems. These complicated, dynamic domains are frequently unpredictable; thus, there is perceived benefit in an approach that models the decision making activity in terms of how actors can proceed through the process rather than how they actually do or should. The research involved a detailed examination of contemporary theories on decision making. Desk-based research was used to study the implication of decision making for the role of combat ID. A model of decision making for combat ID was then produced in a small table-top study involving a subject matter expert in the field of tank warfare. Whilst the model has been developed specifically for tank-on-tank warfare, it is broadly applicable to all combat ID activities and forms a solid basis for adaptation to other domains including maritime and air.	Yes
Command & Control	Decision making training for synthetic environments: Using the decision ladder to extract specifications for synthetic environments design and evaluation	This research has explored the fields of decision making, training and synthetic environments. Issues surrounding the acquisition of expertise have been addressed. This understanding has been used to develop and document an approach for generating a synthetic environment fidelity specification. This is believed to have a significant role in the design of future synthetic environments. The approach can be applied very early in the design lifecycle, creating a clear specification for the developers of the system. The approach can also be used in the evaluation of existing products for the purpose of mid-life refreshments. It is also contended that the approach has utility in product selection between commercial off-the-shelf (COTS) products.	Yes

HFI DTC Deliverables

Subject Area	Title	Description	Available to Download from HFI DTC Website
Deterrence & Suppression	A Review of the Nature of Deterrence And Suppression	The aim of the project is to improve MoD's knowledge of deterrence and suppression. Ultimately, such knowledge will aid in the definition of future weapon systems and advise on weapon mixes to achieve a desired goal in a cost-effective manner.	
Education & Training	Educational Requirements - Future Trends in Deployments and Technologies	The principle objective of this work is to investigate the impact that future trends in technology and deployment scenarios have on the educational requirements of future military personnel. This report focuses on identifying HF problems specific to the selection, education and training of the person rather than interfaces with equipment.	Yes
Education & Training	E-learning Instructional Design Guidelines	These guidelines are intended to help support best practice in implementing an e-learning solution within UK Defence, which is instructionally sound, and makes best use of the advantages offered by e-learning as an instructional medium. This document is intended to be used by instructional designers, and project managers to support best practice in instructional design as it applies to e-learning solutions, and enable a quality assessment of an e-learning solution according to an objective set of criteria in a number of distinct areas.	Yes
Education & Training	E-learning Project Management and Documentation Guidance	This report outlines documentation and project management considerations for Defence organisations that are considering e-learning development, whether this is outsourced or developed in house. This document is complementary to DTSM5 and other DCTS issued documents that consider e-learning.	Yes
Education & Training	E-Learning Selection Toolkit, 09/03/06	The e-learning selection toolkit allows the evaluation of the suitability of a single course for delivery through e-learning, or allows a number of potential e-learning projects to be compared for their potential suitability in a number of areas.	
Education & Training	Information Exploitation Competencies	The principle task of the study reported here was to determine what additional competencies need to be included in the IX Competency Framework to enable joint decision making and collaborative planning.	
Education & Training	Operational Information Management Skills Knowledge and Attitudes Requirements	This report details the findings of a study conducted to determine the information management skills, knowledge and attitudes required by staff officers in operational HQs.	Yes
Education & Training	The E-Learning Selection Toolkit - User Guidance	User guide for the e-learning selection toolkit spreadsheet	
Electronic Mission Planning	ComBAT Evaluation: WESTT Analysis & Usability Study Results	The UK Ministry of Defence is currently developing and testing the Common Battlefield Applications Toolset (ComBAT) command and control support tool. This report describes a human factors evaluation of the latest version of the ComBAT tool (BCIP 5). Researchers from the HFI DTC were invited to conduct an evaluation of the tool during planning and execution activities in order to inform future ComBAT system development.	
Electronic Mission Planning	HFI DTC: Mission Planning Analysis – Summary, Conclusions and Recommendations	The Human Factors Integration Defence Technology Centre (HFI DTC) conducted a range of human factors analyses on the process of electronic mission planning in order to inform the development of future electronic mission planning systems. An in-service electronic Mission Planning System (MPS) was used as a focus for these analyses. Secondary aims were to compare the traditional paper map planning process with the contemporary MPS software tool planning process, and to compare a range of human factors methods in terms of their outputs, ease of use and resource usage involved.	Yes
Emerging Technology	Early Project Guidance for Screen Real-Estate Sizing	The following report investigates the possibility of accurately determining the required screen real-estate size early in a project's life cycle. The findings are that screen size should be driven by the tasks a user will perform while using the display. Tasks that benefit from an Egocentric approach see improved performance with screen sizes above 25 inches. Tasks where the user is learning the spatial layout of an environment from an Exocentric view, for example a bird's eye, benefit from a display less than 24 inches. Screen real-estate showing primarily text that the user needs to read and comprehend should be sized on the minutes-of-arc subtended at the user's eye. The report develops a decision tree to guide any project member through the thought process regarding choosing a screen size. Additionally two equations aiding in the display of textual information have been created.	
Emerging Technology	Developing Guidelines for Distributed Teamwork: Review of the Literature and the HFI DTC's Distributed Teamwork Studies	Distributed teams are increasingly being employed within complex systems and rapid technological advances are affecting the ways in which they work and can potentially work. Despite this, guidance on how distributed teams should work, how they should be organised and trained, what communications technology they should use and how support systems should be designed is not readily available. This report presents, based on a review of the relevant literature and also a series of naturalistic case studies undertaken previously by the HFI DTC, a series of initial guidelines on how teams, systems, technology and procedures should be designed and organised in order to enhance distributed team working performance	Yes
Emerging Technology	Emerging Technologies for Distributed Teamwork	We considered this work from the perspective of artefacts; by dividing an artefact into two elements (cognitive and technological), we could evaluate the impact of alternate technology choices. Example cognitive artefacts were taken from the Operational Field Trial 3 planning phase, and example technological artefacts were amassed in a technology repository based on previous work on the Technology Appropriateness Guidelines Tool (TAG Tool). Cognitive Work Analysis was applied to model a generic Abstraction Hierarchy (AH) of the elements that contribute to distributed teamwork in the command and control (C2) Armed Forces domain. As a result it was possible to simulate how different technological artefacts, combined with cognitive artefacts, could contribute in different ways to distributed teamwork. By mimicking this model with a relational database in Access 2007, not only the type of contribution, but also its extent could be identified by the application of rating scales. Practical constraints were applied to filter for appropriate technological solutions.	Yes
Emerging Technology	Realising CWA Designs within the Network Paradigm	The present report examines different ways in which the output from a Cognitive Work Analysis (CWA) SOCA diagram can be translated into social networks. Where CWA is primarily formative in nature, suggesting a range of possibilities for a prospective sociotechnical system subject to constraints identified by the analyst via the CWA process, networks tend to be descriptive/normative in nature, allowing empirical data to be explored from various perspectives via a set of linked networks. The main motivation for seeking to unite CWA with network analysis is to provide an early human factors analysis technique for systems design that is deployable at the concept phase of CADMID.	Yes
HFI Awareness Material	Frontline Newsletters	HFI DTC Newsletters	
HFI Process	An HFI Desktop Aid - Rationale and Framework (WP 3.2.3)	In this report a review of existing HFI support tools is conducted in order to identify characteristics and functions that might prove useful in a unified HFI support tool. An outline for development of a unified tool for the management of HFI is provided. This tool is intended to rationalise the support that is available for those managing the HFI process and to ensure that easy access to relevant guidance is available at all stages.	Yes

HFI DTC Deliverables

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HFI Process	Barriers & Enablers to HFI Final Review and Recommendations	This report is concerned with the identification of barriers to the existing HFI process, and corresponding enablers that will help improve the process of HFI and those factors critical to its application and success. The aim of this report is to collate, examine and summarise the recommendations resulting from the previous studies. It also presents a set of recommendations for change that will enhance the HFI process.	Yes
HFI Process	Cost-Justifying HFI (WP 3.7.2): A comprehensive approach to provide evidence and guidance	This report outlines concepts and approaches for providing evidence of HFI cost benefits to promote the uptake of HFI.	
HFI Process	Cost-Justifying HFI (WP 3.7.2): Case Studies	This document is a companion to 'Cost-Justifying HFI: A comprehensive approach to provide evidence and guidance'. It provides details on HF-related case studies detailing where HFI was successfully adopted and is believed to have had a cost saving influence on programmes and case studies illustrating how operational problems and additional costs can occur when HFI is neglected.	
HFI Process	Cost-Benefit Analysis for Human Factors Integration: A Practical Guide	It is increasingly accepted that Human Factors Integration (HFI) is critical to ensure that system performance is safe, effective, and efficient. However, HFI is often considered a costly process. The cost benefits of HFI are frequently perceived as intangible. The potential losses due to not applying HFI are rarely assessed early enough for adequate consideration in budget allocations. The financial value of HFI through cost savings is often poorly understood. HFI professionals often find it difficult to express HFI cost benefits and produce early budget plans when uncertainty is still high. Thus, project budget plans often do not allow sufficient resources for HFI. To be able to argue against the various preconceptions that prevent the practical application of HFI, a sound cost-benefit analysis is needed to express both HFI efforts and benefits in business terms. Cost-benefit analysis for HFI technical and management activities is often recognised as a difficult task. This is especially so for larger HFI projects, and during early project stages. It is not always easy to argue that there are situations where it is necessary to spend money in order to save money.	Yes
HFI Process	Developing Human Factors Guidance for COTS Equipment Assessment	The report identifies requirements for providing HF guidance for COTS equipment from a practical perspective, by identifying characteristics and processes of COTS equipment selection activities on the one hand, and HF impact, on the other.	Yes
HFI Process	HFI - Managing Organisational Change	An approach has been taken that focuses the review specifically on one aspect of Business Process Engineering (BPE), the management of organisational change, that is judged to be both one of the most relevant to the Human Factors Integration (HFI) process. This review emphasises the contribution that could be made to the existing HFI process (and hence to defence procurements) through the inclusion of extensive change-management experience that resides in the commercial business community. The review draws on lessons from case studies of organisational change.	Yes
HFI Process	HFI and Emerging Technologies ANNEX. Emerging Technologies Review	Annex to 'HFI and Emerging Technologies' containing extracts from recently published articles to give an overview of the type of technology developments that are currently emerging.	Yes
HFI Process	HFI DTC: Guidance for Improving HFI in Design Trade-offs	The principal aim of this work was to enable Human Factors (HF) stakeholders to influence and contribute to trade-off decisions. This task was carried out in two stages: a research stage and a validation stage. The initial study examined the problems that exist with getting Human Factors issues considered in trade-off studies, explained the trade-off process and described the potential challenges. It then outlined a way of carrying out trade-offs that does include HF. In the validation stage, the trade-off process, along with the methods that support the process, was applied to a real project as a case study.	
HFI Process	HFI DTC: Guidance on the Use of Synthetic Environments to Support Human Factors Integration	Guidance for the use of Synthetic Environments (SEs) to support human factors (HF) activities carried out as part of the HFI process.	Yes
HFI Process	HFI DTC: HFI Methods and Processes Literature Review	This work package is concerned with researching the effectiveness of Human Factors Integration (HFI) within the whole development life cycle of military and civil equipment. A review of existing HFI guidance, literature and research was undertaken specifically to identify the barriers to the application of HFI. From this, the report suggests research areas to direct future concerned with a more effective approach to HFI that addresses the identified shortcomings.	
HFI Process	HFI DTC: Improving HFI in Design Trade-offs	This report examines the need for a formalised method of arguing and presenting HFI trade-offs. The report presents a suggested formalised trade-off process, which discusses and presents approaches to capturing and recording arguments in a formal, logical way.	
HFI Process	HFI Process Booklet	Guide to HFI process for the procurement of better equipment and capabilities (this has been superseded by the People in Systems TLMC Handbook)	Yes
HFI Process	The People in Systems TLMC Handbook	The People in Systems handbook is aimed at all members of the MOD Unified Customer community and is divided into sections to support Capability planning, delivery and generation. Its purpose is to highlight the importance of identifying, assessing and mitigating 'people-related risks' in TLMC and to raise awareness of the opportunities for considering the human element within acquisition.	Yes
HFI Process	HFI Requirements & Acceptance	The aim of this work package was to develop a better understanding of how human factors can be specified in requirements and acceptance criteria and to develop suitable guidance. The guidance is to help those charged with specifying the customer/supplier interface either at the MoD/prime contractor level of the Prime/Sub contractor level.	
HFI Process	HFI Within Systems Engineering Case A Scoping Document	This document outlines the justification and initial scoping work to support the development of HFI within a Systems Engineering Case. Similar to the Safety Case, the HFI Case will provide a progressive, traceable set of evidence against system requirements.	
HFI Process	Human Factors Integration and Emerging Technologies	This document describes a tool for classifying the likely HF issues associated with a nascent technology. The tool is designed for use by designers and those involved in procurements before HF specialists are formally included and aims to flag HF issues at the earliest stages of a concept's development. It can be applied to existing as well as emerging/nascent technologies and can be used repeatedly throughout the design stages as the design concept and details of the technology are refined.	Yes
HFI Process	Recommendations for the Supplier HFI Competency Framework	Report on the development of a framework to capture the Human Factors Integration (HFI) competences of UK suppliers. The report gives a potential approach to the categorisation of HFI competence, the provision of evidence to support supplier claims of competence within those categories and potential routes to assessment.	

HFI DTC Deliverables

Subject Area	Title	Description	Available to Download from HFI DTC Website
HFI Process	Review of HFI Practice and Initiatives in the MoD and Industry: A Summary of Two Workshops	This report summarises the results of two workshops aimed at eliciting the opinions of stakeholders from the HFI community, in both the defence and civil domains. Specifically, stakeholders were asked to comment on what they perceived to be the barriers to the effective implementation of the HFI process. Recommendations for overcoming these barriers were given, along with suggestions for possible future research and development activities within the HFI DTC.	
HFI Process	Review of Human Factors Integration from within and outside of the MoD - Interim Report	The purpose of this work package is to explore current barriers to Human Factors Integration (HFI). The report summarises the feedback elicited from interviewing people with experience of trying to integrate HF into the project lifecycle in both the military and civil domains, to draw out the issues, difficulties and successful strategies employed by people with responsibility for HFI. This information is used to recommend improvements in HFI processes.	
HFI Process	Review of Systems Engineering with respect to Human Factors Integration. A review of interview findings with the MoD and Industry	This study was part of a wider research programme investigating the likely evolution of Systems Engineering (SE) in Defence and the role that Human Factors Integration (HFI) might have in the process. The study remit required that a number of interviews be performed with people in the Ministry of Defence and Industry that practice SE to establish how the disciplines of HFI and SE are approached and specifically how they should be better integrated. This report details a generic, high-level, best practice model of HFI within an organisation and its relationship to a project lifecycle. The findings of the interviews are reported in the Annex and the salient points brought forward. Barriers to improved integration of SE and HFI within the Defence Procurement Agency (DPA) have been identified and recommendations made to address these points.	
HFI Process	The Identification of Interdisciplinary Synergies: Lessons for HFI from other Human-Centred Design Approaches	Review of other domains and industries for techniques or perspectives that might benefit Human Factors Integration (HFI).	Yes
HFI Process	Use of Synthetic Environments to Support HFI Position Paper	To prioritise HFI DTC research proposals, a review of stakeholder issues and requirements related to the development and use of Synthetic Environments (SEs) was conducted. This paper contains the results and a review of the HFI DTC research programme for years 4-6. It makes recommendations relating to the focus of proposed topics, closer liaison with customer and stakeholder organisations and the consideration of alternative (or additional) areas of study.	Yes
HFI Process	Modelling Human Factors using the Systems Modelling Language	This document presents the findings of the Human Factors Integration Defence Technology Centre (HFI DTC) research project to investigate the utility of the UML/SysML as tools for modelling Human Factors (HF) aspects of systems design. The approach taken has been to use a case study of a hypothetical system to see if the SysML could be applied to modelling the Human Views of that system. The conclusion is that the SysML is a suitable tool for modelling most of the Human Views of a Systems Architecture and that it can be a useful tool for HF professionals, without any modifications being made to the language itself.	Yes
HFI Process	Incorporating Social and Organisational Factors into HFI: Initial Report.	In recent years a seventh social and organisational domain has been added to Human Factors Integration (HFI) in recognition of the importance of broader human and organisational issues associated with Network Enabled Capability. While the new HFI Social and Organisational Domain reflects many existing areas of knowledge in human factors, e.g. macroergonomics, guidance to support designers of defence capability is limited. This research by the HFI Defence Technology Centre (DTC) was established to address this issue. Its aim is to provide definition and guidance for incorporating social and organisational factors (SOF) into HFI. This report describes the first stages of activity to meet this goal.	
HFI Process	Developing the HFI Social & Organisational Domain: Final Report	This report by the HFI DTC for the Defence Technology and Innovation Centre (DTIC) summarises the work on WP 2.17/2.18: Incorporating Socio-technical Systems into Human Factors Integration (HFI). The focus of this work was to develop guidance for consideration of broader Social and Organisational Factors (SOF) in HFI. The report summarises key activities undertaken in the course of the work to define the social and organisational domain and provide guidance. The methodology used throughout the project is described. Information is provided about previous research activities, including stakeholder consultations and a targeted literature review to identify the types of SOF likely to be relevant. The most recent stakeholder activity to review the prototype SOF framework is described and the key findings from this activity are presented. Following the research activities the SOF framework content has been revised and developed into a range of guidance materials and a process for application proposed. This report provides recommendations for further activities required to develop the SOF framework and proposed follow-on activities to broaden the awareness of this info throughout the defence community.	Yes
HFI Process	The HFI Case Concept: Guidance on Specifying, Tracking and Documenting Human Factors Integration Requirements, Acceptance Criteria and Evidence	This document is not an introductory guide to HFI (this has been covered elsewhere). It requires a basic understanding of essential HFI concepts, particularly the HFI process. It draws on several existing sources of information that are referenced here, but not reproduced in-depth. This document takes a capability-wide perspective on HFI, to enable HFI not only across its different technical domains, but also in terms of its different roles throughout the capability lifecycle. It aims to provide a common structure for HFI requirements specification and tracking, which a range of different stakeholders in different roles can relate to.	Yes
HFI Process	The HFI Case: Short Summary Report	This report accompanies the guidance material produced for an 'HFI Case' (Human Factors Integration Case), to be published separately. It is a short report that summarises aspects that could not be included directly in the guidance, including (a) an executive summary of the HFI Case guidance material; (b) a discussion of the potential status of a formal HFI Case, based on the ideas outlined in the guidance document; (c) a discussion of the potential stakeholders benefiting directly or indirectly from this work; (d) potential routes for taking this work forward, outlining development options.	Yes
HFI Tools & Methods	C4I HFI Design / Evaluation Methods in Access 97 2000 database	Databases of the various human factors design and evaluation methods. Access 97 and 2000 versions.	
HFI Tools & Methods	Cognitive Task Analysis: Current use and practice in the UK Armed Forces and Elsewhere	This report is concerned with Cognitive Task Analysis (CTA). It covers the origins, growth, and diversity of CTA as an activity, current practice in the UK Armed Forces and civilian operations, reviews an extensive range of archive material and draws a number of conclusions as to the best practice. It reveals that there is no consistent use of CTA in the Armed Forces. Recommendations are made as to how CTA techniques could be implemented so as to benefit UK MoD with regard to both training and procurement.	Yes
HFI Tools & Methods	CWA of an Armoured Battle Group in Quick Attack formation: Validating the CWA Tool	CWA of an Armoured Battle group in Quick Attack formation: Validating the Cognitive Work Analysis Tool	
HFI Tools & Methods	Hierarchical Task Analysis: Developments, Applications and Extensions	Review of the Hierarchical Task Analysis technique.	Yes

Subject Area	Title	Description	Available to Download from HFI DTC Website
HFI Tools & Methods	HTA: The development and use of tools for Hierarchical Task Analysis in the Armed Forces and elsewhere	This report covers the recent past, and current usage of the HTA technique in, and for, the UK Armed forces. It considers the reasons why an HTA should be (or may have been) conducted. It then considers current and recent practices in a selection of Governmental and other organisations – both at home and abroad. There is also a comprehensive discussion of the development, enhancement, and extension of the original HTA approach, together with an indication of what an adequate HTA Tool should contain. It concludes with a review of software based tools for performing an HTA, and of related tools and tool-sets.	Yes
HFI Tools & Methods	Human Factors Design & Evaluation Methods Review	The overall aim of this work package was to review and evaluate HF methods and techniques suitable for use in the design and evaluation process of future C4 systems. Each HF technique is described and reviewed using a set of pre-determined methods evaluation criteria and the output of the review acts as a guide for HF practitioners in the selection and use of appropriate HF techniques.	Yes
HFI Tools & Methods	Human Factors Design Methods Review	This report contains a review of human factors (HF) design methods. The overall aim of this work package was to review and evaluate HF methods and techniques that might be suitable for use in the C4I systems design lifecycle. This document is intended to act as a guide for HF practitioners in the selection and use of appropriate HF techniques.	Yes
HFI Tools & Methods	Technology Appropriateness Guide (Software & Documentation)	Technology Appropriateness Guide Software	
HFI Tools & Methods	Technology Appropriateness Guidelines (TAG) Tool	The goal of this research theme was to set up and maintain an Internet hosted repository of Human Factors (HF) "Technology Appropriateness" guidance material for current and emerging technologies. An Internet hosted Technology Appropriateness Guidelines (TAG) Tool with a database of technologies was created to provide HF practitioners and Integrated Project Teams (IPTs) with information on current and emerging technologies. The TAG Tool was designed to be a repository for new and current technology information along with associated HF guidance and reference material. The TAG Tool was designed to allow users to share information and experiences and was intended to support a Community Of Interest (COI) around the issues associated with technology selection, insertion and use. The aim was to allow users to share their knowledge and experiences for mutual benefit. The database was structured according to a taxonomy designed to focus on the human and encompass as wide a range of new technologies as possible.	Yes
HFI Tools & Methods	The KSA Tool V1.3b	Software to aid the conduct of a Knowledge, Skills and Attitudes (KSA) analysis.	
HFI Tools & Methods	Using Cognitive Work Analysis to Explore Activity Allocation within Military Domains	Cognitive Work Analysis (CWA) is frequently advocated as an approach for the analysis of complex sociotechnical systems. Much of the current CWA literature within the military domain pays particular attention to its initial phases, Work Domain Analysis and Control Task Analysis. Comparably, the analysis of the social and organisational constraints receives much less attention. Through the study of a helicopter Mission Planning System (MPS) software tool, this report describes an approach for investigating the constraints affecting the distribution of work. The report uses this model to evaluate the potential benefits of the social and organisational analysis phase within a military context.	Yes
HFI Tools & Methods	Informing Dynamic Allocation of Function: Applying Cognitive Work Analysis to the Design of Rapidly Reconfigurable Interfaces in Complex Networks	Cognitive Work Analysis (CWA) is frequently advocated as an approach for the analysis of complex sociotechnical systems. This report uses this approach to model the constraints affecting a command and control micro-world. The micro-world under analysis has been developed specifically to explore fundamental issues in design for command and control. The paradigm is, essentially, a basic sensor-to-effector system; the micro-world can be used to explore the role of sensors, effectors and commanders, focusing on how work is allocated amongst these groups.	Yes
HFI Tools & Methods	Creating interoperability between the Hierarchical Task Analysis and the Cognitive Work Analysis Tools	This document addresses the HTA (Hierarchical Task Analysis) tool and the CWA (Cognitive Work Analysis) tool to establish if a link between these two tools, allowing data to be passed between them, would be appropriate and beneficial.	Yes
HFI Training	Awareness Training	MoD HFI training module presentation - introduction to HFI.	
HFI Training	HFI for Requirement Managers	MoD HFI training module presentation - HFI for requirements managers.	
HFI Training	Training for DEC Staff Officers	MoD HFI training module presentation - HFI for DEC staff officers.	
Human Error	Human Error and Performance Database	This report presents an overview of a database of human error being developed for this work package. The current contents of the database, in the form of Human Error Probabilities, are provided in an Appendix .	Yes
Human Views for MoDAF	HFI Support for MODAF: The Development of Human Views Final Report	Whilst MODAF is an essential step towards coping with the complexity of large system acquisition such as NEC, it has been identified that MODAF (and similarly the US Department of Defence equivalent – DoDAF) has shortfalls in incorporating HFI issues. Based on the insight that the socio-technical system perspective needs to be better supported through MODAF, a list of MODAF shortcomings was produced based on reviewing MODAF Views, by drawing on relations to HFI functions and HFI design areas. Through this analysis, the need for establishing a number of complementary Human Views (HVs) that cover missing issues was substantiated. This report provides background information underlying the HV development.	
Human Views for MoDAF	The Human View Handbook for MODAF	This document describes a set of Human Views (HVs) to be used as complementary elements to MODAF – the Ministry of Defence Architectural Framework. It aims to clarify the role of Human Factors when creating Enterprise Architectures in support of acquisition – in order to facilitate both Human Factors Integration (HFI) and Systems Engineering (SE).	
Impact of Emerging Technology	Impact of Emerging Technology on Humans - Current Advice	This study is focused on the impact of emerging technology on humans i.e. on how to handle the undefined problems of new or emerging technology rather than the known issues of patching with existing technology. This document is a technical progress report to collate and review current Technology Insertion (TI) advice and guidance from the UK and overseas.	Yes
Information Management	Information Management in Intelligence and the Planning Process	This 'Restricted' study is the first phase in a project concerned with developing an understanding of the precise tasks involved in intelligence analysis. This report has studied intelligence processes in a number of civilian and military contexts in order to uncover common features.	
Multinational/Multi-level Operations	Analysis of multi-agency intent: An example from the emergency services	This report presents an investigation of command and control issues relating to multi-agency operations. Command intent, communication and coordination are explored within the context of the UK emergency services, through an analysis of the bomb attacks in London on 7th July 2005.	Yes

Subject Area	Title	Description	Available to Download from HFI DTC Website
Multinational/Multi-level Operations	Common Operating Pictures and their role in Multi-Agency Work	Within the field of Command and Control research, Common Operational Pictures (COPs) are presented as a method for improving coordination between different agencies. This report describes alternative perspectives on the format of COPs and how COPs could or should be used. It then goes on to present examples from multi-agency operations, in order to identify the processes that a multi-agency COP would need to support in order to be of benefit. The distinction is drawn between the COP as a product (i.e. a picture of the state of the situation) and as a process (i.e. an integral part of decision-making); the requirement for a common understanding of the nature of the situation and the appropriate response, over and above a superficial awareness of information, is emphasised. Requirements for the development of multi-agency COPs are also identified.	Yes
Multinational/Multi-level Operations	Coordination between the Military and Civilian Organisations: Issues and Solutions	In the future, the requirement for the military to work in tandem with civilian organisations is likely to increase significantly; however, coordination between the military and other civilian organisations has been previously been found to be limited, which adversely affects the efficiency of multi-agency system performance. This report presents the findings derived from a program of research of which the aim was to first, identify the issues that hinder coordination between the military and civilian organisations, and second, to specify guidance on how coordination between the military and civilian organisations might be augmented during emergency scenario responses. The research involved a review of the literature surrounding the area of multi-agency coordination and interoperability, a review of previous large scale emergency multi-agency responses and the conduct of an observational study focusing on a Military Aid to the Civil Authorities (MACA) training exercise. The findings indicate that, although multi-agency responses often achieve their goal, there are often various issues that hinder coordination levels when the military attempts to work in tandem with civilian organisations. In particular, the problem of information sharing at the gold command level is focused on and a series of potential solutions are proposed.	Yes
Multinational/Multi-level Operations	Human Factors Interoperability within Multi-National/Multi-Level Operations Scoping Study	This study provides a literature review based research into three key areas of Human Factors and force interoperability from a non-technical point of view, across all lines of development, looking at international (including NATO) co-operation and coalition force operations. The key aim is to identify research gaps through analysis and to identify follow-on research and options for further study within the multi-national coalition operations banner.	Yes
Multinational/Multi-level Operations	Development of Requirements and a Prototype for a Cultural Awareness Decision Support Tool	Military operations are becoming more multi-national and are increasingly focused on peace-keeping, operations other than war (OOTW) and counter-insurgency type operations. The literature has identified a need to increase the cultural awareness of our military and medical personnel when performing their duties. The day to day cultural interactions with the local population can unwittingly turn a potential 'friend' or 'neutral' into an enemy or induce locals to provide help or information to insurgents. Thus in an effort to help win the battle of 'hearts and minds' and improve cultural relations within the multi-national force, it was felt that some kind of portable 'cultural awareness decision support tool' might be one avenue to investigate to help improve the cultural awareness of forces presently deployed abroad. This report aims to provide a background to and detail the derivation of content for a prototype cultural awareness decision support tool.	
Multinational/Multi-level Operations	Multi-Agency Operations: Cooperation During Flooding	This report presents an investigation of command and control during multi-agency operations, focusing specifically on military involvement in civil emergencies and on Search and Rescue activity. In order to do this, three scenarios have been examined. The first was the combined military and civilian defence of Walham electricity substation from rising floodwater in July 2007. The second incident was based on the flooding of the coastal town of Boscastle in August 2004. The third incident was an accident involving an individual aboard a fishing vessel in UK waters. The findings are presented in relation to the concepts of Command Intent and Situation Awareness. This analysis has highlighted the difficulties in bringing together disparate organisations with different goals and priorities to work on one-off collaborative operations; a lack of experience of working together, different training and experience and separate command structures all work against effective cooperation on joint tasks. This is further hampered by discontinuity of key staff over the lifetime of large or complex operations.	
Research Summary	HFI DTC Research Yearbook	Yearbook summarising highlights from the HFI DTC research programme.	
Scenarios to Support HFI	What Constitutes a Properly Defined Scenario?	This report identifies the components of a scenario, the relationships between them and of the individual items within each component. This offers a basic scenario architecture which may offer the basis for a generic scenario architecture. Future work will be targeted at mapping a sufficient number of scenarios onto the basic architecture to distinguish different scenario types.	Yes
Serious Games	Emerging Technologies for Defence Medicine - PTSR Support Tool Software	Data files and environments for the FarCry game engine, used to make the Therapeutic Exposure Support Tool (TEST).	
Serious Games	Emerging Technologies for Defence Medicine - PTSR Support Tool Videos	Videos of the Therapeutic Exposure Support Tool (TEST) in action.	
Serious Games	Initial / Junior Warfare Officer Performance Capture Tool: Research Milestone Summary	This report is a short summary of an informal assessment of I/JWO tasks and performance features conducted during a single day's exposure to simulator assessments at HMS Collingwood (Endeavour Building), which resulted in the development of a prototype trainee multitasking performance capture tool, based upon an OpenGL-based, PC-hosted part-task simulator.	Yes
Serious Games	Interactive Trauma Trainer (ITT) Demo - Software	Proof of concept games-based surgical trainer.	
Serious Games	ITT Short Video MPEG1	Video showing the Interactive Trauma Trainer being used (MPEG1 format)	Video Clip
Serious Games	Short Sequence of Trauma Trainer Activities	Video showing the Interactive Trauma Trainer being used (same as 'ITT Short Video MPEG1, but wmv format)	
Serious Games	Sub Safe Software	Sub IPT SubSafe Training Transfer software - used to train spatial awareness of safety critical systems within the Trafalgar class submarine.	Video Clip
Serious Games	The Making of ... ITT Video V1	MPEG format 'making of' video for the ITT.	
Serious Games	Training decision making using serious games	Well developed serious games which leverage the properties of games, digital games, and simulation appear to present exciting opportunities for creating immersive experiential learning environments for decision making training, enabling students to become active learners in a safe benign environment, but one which encourages them to take risks and explore the solution space, with the benefit of immediate feedback, and subsequent review of performance.	Yes

HFI DTC Deliverables

Subject Area	Title	Description	Available to Download from HFI DTC Website
Serious Games	Training decision making using serious games: Requirements analysis for decision making training	The objective of Work Package 4.6 has been to establish the requirements for a desktop synthetic environment (SE) decision making training support tool and to develop a 3D concept demonstrator, project name 'CODE'. CODE is underpinned by psychological decision making theory and learning theory rather than being essentially technology driven. CODE has been developed around an urban foot patrol context to help improve the decision making agility of novice decision makers, with little or no operational experience, being deployed to complex, high tempo and high stakes operating environments. By working through the three levels of CODE trainees will gain experience in identifying and assessing cues from a virtual urban patrol environment, will begin to attend to negative information, and will make decisions from a number of decision actions options. These skills are reinforced by the provision of instant feedback. Ultimately, CODE could form part of pre-deployment training, either as part classroom-based training, or as an in-barracks revision tool for independent practice.	Yes
Serious Games	Alchemy Video	Alchemy Video Demos	Video Clip
Serious Games	IED Video	IED Video Demo	Video Clip
Serious Games	Human Factors Guidelines for Interactive 3D and Games-Based Training Systems Design	This Human Factors (HF) Guidelines Document has been produced to satisfy research deliverables for two UK-based projects conducting research into the effective exploitation of computer games technologies for education and training.	Yes
Synthetic Environments	HFI DTC: Current and Future Use of Synthetic Environments	The purpose of this work is to gain an understanding of existing Synthetic Environment (SE) capability. This understanding will then be used to investigate future uses and requirements of SEs to support HFI. In order to assess the current position in SEs, a survey of existing capability was undertaken. The survey focused on the HF aspects of SEs and the extent of support for the HFI process.	Yes
Synthetic Environments	HFI DTC: Provision of a Synthetic Environment to support HFI	A Synthetic Environment test bed was developed to provide a reconfigurable tool to support Human Factors Integration (HFI) activities. This study reported on an experimental scenario designed to (1) Demonstrate (and provide a process for) the use of SEs in whole lifecycle engineering and across HFI domains; and (2) Investigate the particular HF issues related to the use of uninhabited vehicles in urban environments.	Yes
Synthetic	HFI DTC: Synthetic Environments Review	Synthetic Environments (SEs) review database.	
Synthetic Environments	HFI Federate and HF Tool Evaluation	The Human Factors Integration (HFI) Federate and HF Administrator Tool were originally developed from HFI DTC research into the use of synthetic environments to support HFI. The purpose of the HFI Federate and HF Administrator Tool was to support the measurement and collection of human factors performance data of tasks carried out in a synthetic environment.	Yes
Synthetic Environments	Uninhabited Systems - data files	HLA federate for measuring human performance within an SE.	
Synthetic Environments	Use of SE to improve HFI Process (HFI Administrator Tool Software)	HFI Federate and HF Administrator Tool to support the measurement and collection of human factors performance data of tasks carried out in a synthetic environment.	
Technology Insertion	The Impact of Technology Insertion on Organisations	Technology Insertion, the activity of introducing new technology into an existing system, is a massive challenge and one that is receiving more attention from technology researchers and practitioners. Similarly, the development of technology has a long history of impacting upon the organisation. This report focuses on the changes and impacts that technologies have had upon organisations during recent decades. The literature suggests that technology insertion projects, and technology projects as a whole, are prone to failure. The reasons for such a high failure rate are the unique risks that threaten technology programmes. Despite the developments in risk assessment tools and techniques, research has found that the rate of technology project failure has not reduced. The findings suggest that it is currently almost impossible to predict accurately whether a technology will be a success or failure, for the simple reason that there are too many interacting organisational and technical variables at work. Although existing tools are designed to support the identification of potential risks, they currently allow users to take a narrow view and enable them to ignore key organisations designed to alert the practitioner to a broader range of issues, would be a valuable dev practitioners.	Yes
Technology Insertion	Technology Insertion Tools: A Feasibility Study	This feasibility study provides a consideration of what is involved in the development of a Technology Insertion tool. Probabilistic models, such as Bayesian Networks (BNs) are one suggested approach to the challenge of developing a predictive tool. The strengths, weaknesses, benefits and challenges of using BNs are considered in greater detail.	Yes
Technology Transfer	Barriers to Technology Transfer	This report describes the barriers to technology transfer identified in the open literature. All the barriers had the potential to prevent positive pull-through, communication emerged as the main barrier to successful technology transfer.	
Training	Confederated versus Federated Training in the Maritime Environment: Prioritisation and Implementation	The aim of this study was to investigate the benefits of confederated and federated synthetic training systems; to assess which system offers best training value; and to examine a means of achieving low-cost confederation, namely the Ship Alongside Training Capability (SATC)	
Training	An Assessment of the Benefits of Confederated Versus Federated Naval Training Systems Using WESTT and Cognitive Work Analysis	As part of its Versatile Maritime Training (VMT) strategy, the Royal Navy (RN) is currently investigating the utility of federated (within platform) and confederated (between platform) training systems with a view to identifying which acquisition route will offer the most training benefit and value for money. As part of a wider investigation, the HFI DTC was asked to undertake a human factors analysis of federated, confederated and combined confederated and federated training systems in order to make a judgement on the most appropriate acquisition route to take. The HFI DTC Cognitive Work Analysis (CWA) and WESTT software tools were used to analyse the three training systems. The differences between the three training systems suggest that a combined confederated and federated training system would offer the most training benefit, since it could essentially train more functions and train more elements of a warfare team than confederated and federated only training systems. However, since this option is likely to be unfeasible in the short term due to financial constraints, it is recommended that initially it would be more appropriate to acquire a confederated training system, following which federated training system capability could be built in.	
Training	Database on Simulator Systems, v1	Database documenting the currently available synthetic training venues and systems at a collective level, and reporting on their use and utility.	

Subject Area	Title	Description	Available to Download from HFI DTC Website
Training	Delivering Optimal Training for Future Systems	The work reported here was conducted by the Human Factors Integration Defence Technology Centre (HFI DTC) and was initiated by the Directorate of Analysis Experimentation and Simulation (DAES). The research task, forms part of a wider project studying Optimal Training for Future Systems scheduled for a three-year duration starting in 2006. It was decided that this phase should take the form of a scoping study helping to define the research emphasis of later parts of the project. As the delivery of training for future systems is clearly a multi-faceted problem, it was further decided that this element should focus on the capture of training requirements by the procurement process. Other work, reported elsewhere, will address other aspects of the problem such as the actual means by which future training will be delivered to a target audience.	Yes
Training	Delivering Optimal Training for Future Systems: Simulation Systems Supporting Collective Training	In response to a need to undertake further research studies to determine the optimal balance between live and simulated training supporting collective training at single service, joint, coalition and multi-national levels, a database was requested to document the currently available synthetic training venues and systems at a collective level, and to report on their use and utility. The study deliverable was this database, which was developed using a semi-structured interview methodology. The interview schedule was developed based on direct experience in designing and evaluating training systems, and on the theory underpinning a systems approach to training. Questions included: what simulators do you use to support team or collective training, where are they located, who is being trained, what are students being trained for, where does the simulator training fit in the training sequence, how are the students assessed, how well do you think the system works, and if you could improve anything what would you change? Study participants included subject matter experts from the three armed services, holding a collective training or simulation brief.	
Training	Literature Review on Skill Fade	Every day life is marred with the inability to recall useful and important information when desired. The enjoyment of games and sports are reduced when a player is annoyed because their performance is not as good as it was eight months ago, when they were playing four times a week. Was it just non-use that lead to the forgetting or was it poor training when the information was learnt? This report reviews the findings from research looking at the causes and options for avoiding skill fade.	
Training	A Review of After Action Review Practice for Collective Training in the British Army	The Army Training Development Team based at the Land Warfare Centre (LWC), Warminster are considering ways of improving the effectiveness of the AAR by way of gaining a deeper understanding of current AAR practice. This report encompasses a review of the literature and current practices within the British Army with the LWC as the major source of collective training AARs. The methods used were observations, interviews and a review of Army documentation and published literature. The research concluded that the procedures the Army currently have in place essentially match the 'best practice' identified from the literature review. The data gathered during the interviews suggests that current practice is largely carried out in accordance with Army documentation, although there are some issues which might be reviewed and considered for the future. A number of recommendations are made.	Yes
Training	A Critique of Media Selection Models - analysis of applicability of extant models to current UK military training	The aim of this work is to develop tools and guidance to support the Training Needs Analysis process as applied in the MoD acquisition process. This report provides an evaluation of the suitability of extant media selection models as support tools in this context.  The approach adopted was to first construct a set of evaluation criteria in the form of a media selection model metamodel, and then apply it to the evaluation of a selection of media selection models. The development of the metamodel was based on a consideration of training development lifecycles, training development and media selection theory and an evaluation of the only previously published media selection model evaluation identified in the literature review. The review identified that none of the extant media selection models were suitable for use in support of the MoD's TNA process applied in the acquisition context. As the majority of the models were developed over 20 years ago, they do not cater for the considerable range of technical advances in media since they were constructed. It is concluded that a more robust, theoretically sound model for informing training options analysis is required.	
Training Technology	Rapid Assessment of Tasks & Context (RATaC): Methodological Development	The Rapid Assessment of Tasks and Context (RATaC; Stone, 2004) methodology is a training system needs analysis approach that supports the quick and early capture of salient human factors aspects of tasks and contexts in order to inform the development of technology-based training systems. Despite providing the basic foundations for a useful methodology, the RATaC approach is, in its present format at least, somewhat lacking. Specifically, the methodology lacks theoretical underpinning, the RATaC taxonomy is limited and there is no formal guidance available to practitioners wishing to undertake RATaC analyses. A new iteration of the RATaC methodology was developed based on review of the literature associated with task, context and simulation fidelity. The main issues addressed in this report were: <ul style="list-style-type: none"> <li>• A review of the taxonomy, task and context literature;</li> <li>• The development of prototype RATAc task and context taxonomies</li> <li>• The development of a step-by-step methodological procedure for undertaking RATAc analyses;</li> <li>• A comparison of the newly developed RATAc approach with existing training systems specification approaches.</li> </ul>	Yes