

NEC OUTLINE CONCEPT:
PART 1 - BACKGROUND AND PROGRAMME OF WORK

OVERVIEW

1. This report introduces Network Enabled Capability (NEC). It sets out the origins and purposes of the UK NEC Initiative, and contrasts it with the US Network Centric Warfare (NCW) concept. It then summarises the work undertaken to date and charts future research intentions.

BACKGROUND

2. Network Enabled Capability (NEC) encompasses the elements required to deliver controlled and precise military effect rapidly and reliably. At its heart are three elements; sensors (to gather information); a network (to support the fusing, exchange and exploitation of information); and strike assets to deliver effects. The NEC Outline Concept, which has been developed in the Applied Research Programme Package 13, sets out the background to NEC, characterises it in greater detail, and charts the route towards its realisation.

3. This report is one of a set of eleven that collectively comprise the NEC Outline Concept. Each report is a stand-alone document that will be updated in the light of ongoing research. The reports are as follows:

- a. **NEC Outline Concept: Executive Summary** - introduces the reader to NEC and contains a précis of all the other reports. This Executive Summary will be updated as individual documents are updated.
- b. **Part 1 - Background and Programme of Work** [*This Report*] - introduces the UK NEC programme, contrasts it with the US NCW initiative, and describes work completed and planned to develop it further.
- c. **Part 2 - NEC Conceptual Framework** - outlines the military aspirations for UK Forces and describes the NEC Themes required to achieve them.
- d. **Part 3 - NEC Acquisition and Delivery** - discusses the acquisition and delivery issues that will need to be addressed to realise NEC.
- e. **Part 4 - Experimentation and Research** - contains proposals for experimentation co-ordination, including Network Integration Test and Experimentation Works (NITE Works)¹, NEC related research and International Research Collaboration (IRC).
- f. **Part 5 - Military Operations** - provides interim results of subjective analysis of the operational benefit of Network Enabled Capability in a scenario-based example. [*In this issue of the Outline Concept, this report is supplemented by a presentation illustrating the results of analysis of additional scenarios.*]
- g. **Part 6 - Impact on Lines of Development** - outlines NEC issues pertinent to LoDs.

¹ Formerly known as Experimental Network Integration Facility (ENIF).

- h. **Part 7 - Speculative Architectures** - considers the architecture (including infrastructure) required to deliver NEC.
- i. **Part 8 - Managing the successful delivery of NEC** - identifies lessons from previous relevant IS initiatives that must be applied to NEC to ensure its success.
- j. **Part 9 - NEC Benefits Analysis**² - describes a method for assessing the benefits of NEC and provides two case studies.
- k. **Part 10 - Glossary** - catalogues the terms used to define NEC.

AIM OF REPORT

- 4. The aim of this report is to set NEC in context, to describe the process of developing the Outline Concept and to outline the way ahead for future research.

STRUCTURE OF THE REPORT

- 5. The structure of the remainder of this report is as follows:
 - a. The UK NEC Initiative.
 - b. Research Undertaken
 - c. Future Programme.

UK NEC INITIATIVE

STRATEGIC DRIVERS

- 6. An overarching priority for Defence, drawn from the conclusions of the Strategic Defence Review New Chapter (SDR-NC)³, is to increase the emphasis on the integration of capabilities to allow the rapid and controlled delivery of precise military effect. The UK intends to achieve this through the implementation of Network Enabled Capability (NEC). NEC is the latest in a series of initiatives aimed at digitizing the UK Forces.
- 7. Another impetus for the UK Network Enabled Capability (NEC) initiative is the US Network Centric Warfare (NCW) Concept. NCW is a formal US networking concept and doctrine that seeks to develop into a fully-fledged warfighting capability. It is at the heart of the US transformation process and has been described as ‘the embodiment of the information age transformation of the DoD’⁴. Although an all encompassing description or definition of NCW is elusive, the central tenets can be listed as:
 - a. A robustly networked force improves information sharing;
 - b. Information sharing enhances the quality of information and shared situational awareness;
 - c. Shared situational awareness enables collaboration and self synchronisation, and enhances sustainability and speed of command;
- 8. These attributes have the potential to dramatically increase mission effectiveness.

² This report was developed under ARP13/RE602 - Capability BOI/Audit (MOEs).

³ Cm5566, the Strategic Defence Review, New Chapter dated July 2002.

⁴ DoD Report to Congress on NCW Jul 2001.

SCOPE

9. NEC shares the tenets of NCW, but is more limited in scope in that it is not a doctrine or vision. Nor does it seek to place the network at the centre of capability in the doctrinal way that the term NCW implies. Rather, NEC is much more concerned with evolving capability by bringing together decision-makers, sensors and weapon systems, and enabling them to pool their information by ‘networking’ in order to achieve an enhanced capability. For example, this could be a capability to successfully prosecute a fleeting target of opportunity, or to re-plan dynamically to accommodate new resources in rapidly changing circumstances. NEC therefore commands considerable high-level military interest as it *‘allows platforms and C2 capabilities to exploit shared awareness and collaborative planning, to communicate and understand command intent, and to enable seamless battlespace management. It will underpin decision superiority and the delivery of rapid and synchronised effects in the joint and multinational battlespace’*⁵. Hence, NEC also enables the realisation of emerging UK Doctrine including Effects Based Operations (EBO), Battlespace Exploitation and Knowledge Superiority. The term NEC also implies the wider utility that networking has across the spectrum of operations and not solely to war fighting. This is illustrated in Figure 1 below:

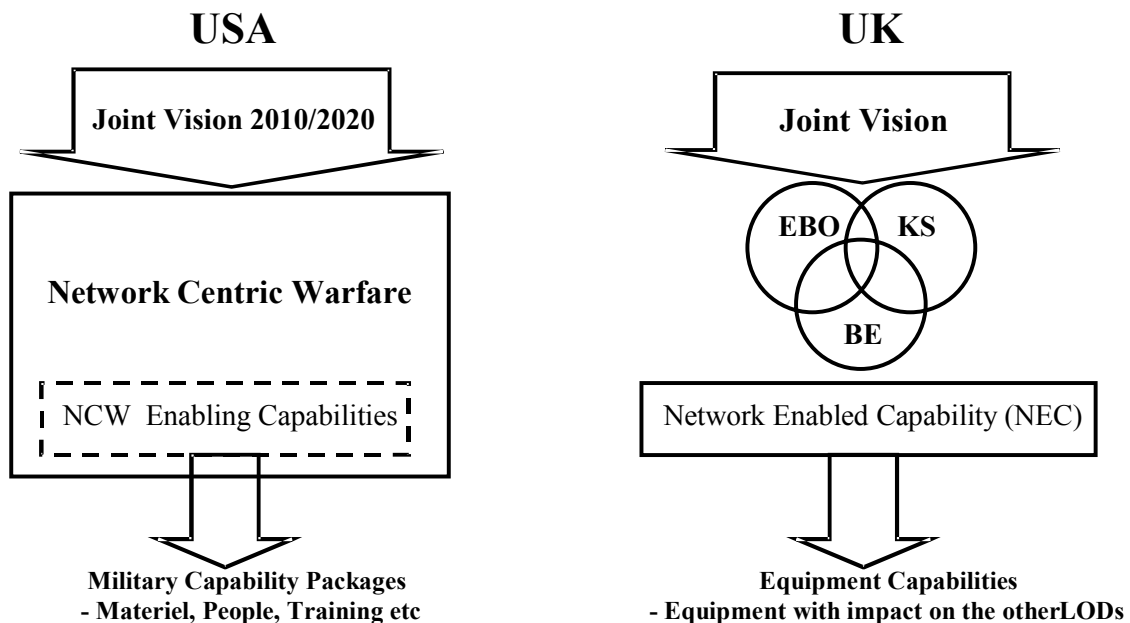


Figure 1 - Comparison of NCW and NEC

OBJECTIVE

10. The Key Objective of NEC is ‘To provide a coherent conceptual and technical framework to link sensors, decision-makers and effects’⁶. At its heart is the use of sensors to gather information, a Command and Control network to fuse, communicate and exploit the information, and strike assets to act rapidly to deliver the required effect. From Joint Vision⁷ and SDR-NC, a number of Military Aspirations for future UK forces have been postulated as set out in Table 1 below:

⁵ Major General R H G Fulton, CM(IS) on 30 Apr 02.

⁶ Major General R H G Fulton, CM(IS), NEC Brief to Industry at RUSI on 28 Nov 02.

⁷ D/JDCC/7/11/1, The UK Joint Vision dated 15 Jun 01.

Table 1 - Military Aspirations

Attribute	Definition
Responsive	Can respond to changes in need, matching tempo to operational situation.
Robust	Remaining effective in the face of depletion of its resources and capabilities.
Broad	Able to operate effectively over a wide range of situations and missions.
Flexible	Capable of achieving effects in multiple ways, using agile resource groupings.
Adaptable	Learning from its operating environment and acting accordingly.
Scalable	Capable of operating in large or small deployments, minimising in theatre footprint.
Interoperable	Operating jointly across all levels and with allies, OGDs and NGOs.
Synchronised	Working coherently to deliver co-ordinated effects and avoid internal conflicts.
Reactive	Rapidly generating and deploying mission groups and achieving aims in reduced timescales.
Responsible	Operating with minimal fratricide and unintended effects.
Cost Effective	Delivering effective military capability at reduced costs.

CORE THEMES

11. NEC has been characterised through a number of ‘core themes’ that would enable those military aspirations. These NEC core themes describe NEC’s desired attributes across the six lines of development; eight of the themes relate to capability and the ninth to the acquisition process. They are primarily addressed in the NEC Outline Concept, Part 2 - NEC Conceptual Framework, but summarised in Table 2 below:

Table 2 - NEC Core Themes

Core Theme	Definition
Full Information Availability	Enabling a user to search, manipulate and exchange information of different classifications captured by, or available in, all sources internal and external to the battlespace.
Shared Awareness	Providing a shared understanding and interpretation of a situation, the intentions of friendly forces, and the potential courses of action amongst all elements in the battlespace.
Flexible Working	Enabling assets to rapidly reconfigure to meet changing mission needs, allowing them to work together with minimum disruption and confusion.
Agile Mission Groups	Enabling the dynamic creation and configuration of Mission Groups that share awareness and that co-ordinate and employ a wide range of systems for a specific mission.
Synchronized Effects	Achieving overwhelming effects within and between Mission Groups by co-ordinating the most appropriate assets available in the battlespace through dynamic distributed planning and execution.

Effects Based Planning	Taking an approach to planning that focuses on the use of military and non-military effects required against an enemy, and is integrated with other planning processes in the battlespace.
Resilient Information Infrastructure	Ensuring information resources can be managed and that secure and assured access is provided with the flexibility to meet the needs of Agile Mission Groups.
Fully Networked Support	Allowing the ready use of non-frontline government bodies, industry, academia and public service capabilities to support operations.
Inclusive Flexible Acquisition	Co-ordinating process across MOD, OGDs and industry that promotes the rapid insertion of new technologies, facilitates coherence between acquisition programmes and provides an incremental approach to delivering 'net-ready platforms'.

STATUS

12. CM(IS)'s plan⁸ for the delivery of NEC was endorsed by the Joint Capabilities Board (JCB) in Oct 02. This plan introduced a number of specific actions to develop a closer understanding of NEC, and to integrate development with related initiatives. This plan is consistent with the Command and Battlespace Management (CBM) Review⁹, which established a number of High Level Goals (HLG) for each of the seven categories of the Defence Capability Framework (DCF). The 'Command' goal is to; *'Optimise the tempo of command in order to make campaign-winning decisions across the full spectrum of Integrated¹⁰ and Joint operations nationally and multinationally'*. Each HLG is underpinned by CBM Change Objectives (CO). CO 2.3 directs D CBM/J6 supported by the 1* NEC Steering Group (SG) to; *'Exploit network-enabled capability in order to enable optimum tempo and decision superiority'*.

RESEARCH UNDERTAKEN

OVERVIEW

13. This section of the paper addresses NEC research undertaken and in progress within ARP13. Dstl has spearheaded NEC research for DEC(CCII) since Apr 2002 under Research Entity (RE) 601, CCII System Concept¹¹. DEC(CCII) directed RE601 to develop a *'vision of the form and function his equipment capability will have in the 2015+ timeframe toward which the individual equipment capabilities can be directed and against which his research programme can be based¹²'*. This has included development of the NEC Concept, identification of the Core Themes, and extensive technical and management advice to DEC(CCII) in support of his mission to *'deliver a timely and effective command, control and information infrastructure capability through a balanced, coherent and affordable equipment programme that meets the current and future needs of UK Defence¹³'*. In addition to support to DEC(CCII), RE601 has supported CM(IS) and DGInfo D CBM/J6 on a wide range of

⁸ D/CM(IS)/2/1 (198/02), Network Enabled Capability - Next Steps dated 29 Oct 02.

⁹ D/VCDs/31/1 (12/053), Command and Battlespace Management Review dated Nov 02.

¹⁰ In this context, *integrated* means at the Political Strategic level to provide effective pan-Government crisis management including co-ordination between Departments of State and their agencies.

¹¹ Dstl Contract CCII_02_06_001, CCII System Concept, v1.0 dated Feb 02.

¹² DEC(CCII) Request for Contract Action (RCA) CCI-02-06-001.

¹³ DEC(CCII) Capability Area Plan 02, v1.1 dated May 02.

NEC and Command and Battlespace Management (CBM) related issues. All these activities are reported in the following paragraphs.

14. The primary outputs from this research are summarised as follows:
 - a. CBM Coherence - Gap Analysis and Desired Capability Characteristics¹⁴.
 - b. Developing CBM Coherence - EP03 Options and the Proposed Way Ahead for NEC¹⁵.
 - c. NEC Outline Conceptual Framework¹⁶.
 - d. NEC Outline Concept [*this paper*].
15. Other activities that RE601 has undertaken in furtherance on NEC include:
 - a. Direct support to DEC(CCII), CM(IS), DAES and the NEC 1* SG.
 - b. International Research Collaboration (IRC).
 - c. Lessons Learned from previous initiatives
16. In the following sections, a summary of each of these key outputs and activities is provided.

CBM COHERENCE - GAP ANALYSIS AND DESIRED CAPABILITY CHARACTERISTICS

17. This report identified and defined a number of key capability related themes (subsequently re-named core themes) for NEC. For each theme, it provided:
 - a. A definition of the core theme.
 - b. A characterisation of the supporting capabilities required to support the theme.
 - c. A summary of gaps in current equipment capability.
 - d. A characterisation of short and medium term advances in capability that would be of value in making progress towards achieving the aims of the theme, as a basis for the review, assessment and formulation of candidate EP Options.
18. These capability characteristics were further developed to provide a checklist against which candidate options for EP03 could be reviewed.

DEVELOPING CBM COHERENCE - EP03 OPTIONS AND THE PROPOSED WAY AHEAD FOR NEC

19. This report summarised the findings of a 5-phase study that, in addition to addressing a number of CBM issues, developed an early NEC Concept. It refined and re-defined the NEC core themes (see Table 1). Based on these themes, it identified five potential EP Options that addressed a significant NEC related capability gap as follows:

¹⁴ CBM Coherence - Gap Analysis and Desired Capability Characteristics, Dstl/IMD/SOS/500/3, Issue 1 dated 20 June 2002 (aka CBM Coherence Stage 4 report).

¹⁵ Developing CBM Coherence - EP03 Options and the Proposed Way Ahead for NEC, Dstl/IMD/SOS/500/3, Issue 1.0 dated 12 Sep 02.

¹⁶ NEC Outline Conceptual Framework, Dstl/IMD/SOS/500/2, Issue 1.0 dated 23 Oct 02; Issue 1.1 dated 3 Dec 02; Issue 1.2 dated 16 Jan 03.

- a. Information Access Capability.
- b. Coherent Situational Awareness.
- c. Net Ready Platforms.
- d. Dynamic Planning and C2 System.
- e. Effects Based Planning System.

20. The report also made proposals on Operational Analysis (OA). This recommended that soft OA (based on judgement) should initially be conducted across all the NEC Capability Themes, to be followed by more detailed OA after further concept development. It identified three ways in which OA could support NEC as follows:

- a. Supporting prioritisation of research and EP options;
- b. Providing evidence to support Initial Gate (IG) and Main Gate (MG) submissions;
- c. Highlighting how investment in research, equipment, doctrine and training will combine to deliver military effectiveness in the short, medium and longer term.

21. Eight potential research themes were also identified for consideration in the light of the wider ARP (including Package 13) research needs as follows:

- a. Communications Networks Research Requirements.
- b. Information Infrastructure (Services) Research Requirements.
- c. Information Infrastructure (Structures) Research Requirement.
- d. Joint Effects Research Requirements.
- e. Human Factors Research Requirements.
- f. Command Research Requirements.
- g. Analysis Methods Research Requirements.
- h. NEC Specification and Acquisition Research Requirements.

22. The report also concluded that, if the NEC vision is to be realised, further consideration should be given to:

- a. Other Programmes - there will be a need for increments to many planned and existing equipment programmes.
- b. Experimentation and Technology Demonstration - further analysis is required to determine the need for experimentation and technology demonstration to support future NEC related options. This is now the subject of the NITE Works initiative.
- c. Acquisition - the development of NEC will require changes in acquisition policy and implementation. This is now being explored by a number of authorities including DGSA and the IA.

NEC OUTLINE CONCEPTUAL FRAMEWORK

23. The Outline Conceptual Framework was developed as a family of stand-alone but closely interrelated reports that summarised current work in developing the NEC Concept. It was intended that each report would be updated independently to reflect emergent work and

current thinking so that, collectively, the document set would form a single, but evolving, repository for capturing outputs of emergent NEC research. It was also intended that the Outline Conceptual Framework should form the basis of the NEC Outline Concept.

24. Three iterations of the NEC Outline Conceptual Framework were produced. These addressed:

- a. Background and Programme of Work - this addressed those issues also addressed by this paper.
- b. NEC Core Capabilities - this addressed Military Aspirations, NEC Themes and NEC Capabilities.
- c. NEC Acquisition and Delivery - the aspirations for NEC will only be met through the combined effects of multiple independently specified and procured systems; this creates major challenges for delivery.

25. In addition, an Executive Summary was produced to summarise the content of these reports, together with other work that was not sufficiently mature to be published in its own report. This included a précis of an Air Manoeuvre scenario used to examine the Implications of NEC on Military Operations.

NEC OUTLINE CONCEPT [THIS PAPER].

26. The NEC Outline Concept has been developed to support continuing research to:

- a. Influence the Equipment Programme (EP) in the short/medium term.
- b. Influence the EP in the long term.
- c. Make recommendations for an NEC experimentation programme.
- d. Make recommendations for the ARP.
- e. Enable MoD to maintain a close relationship with the US/NCW Transformation process.
- f. Assist in MoD's development of an NEC intervention strategy.

27. The results of this programme of research are provided in Parts 3 to 8 of the NEC Outline Concept, and summarised in the Executive Summary. Hence, they are not replicated in this report.

DIRECT SUPPORT TO CM(IS), DEC(CCII), DAES AND NEC 1* SG

28. As illustrated in the UK Research Initiative (above), NEC commands considerable high level attention within MoD. This inevitably results in some 'fine-tuning' to re-direct activities as emerging policies and concepts firm up in the light of ongoing research. As a result, DEC(CCII) has regularly called upon the Dstl research project to provide additional ad hoc support to meet his own short-notice tasks, together with those necessary to meet the needs of CM(IS), the NEC 1* Steering Group, and other members of the ECC. This support has included:

- a. NEC Model. This model, also known as the 'London Underground Map', was developed to meet the needs of the JCB for a simple representation of the information network that links the key components of our Equipment Capability. This model,

which intentionally sacrificed detail for simplicity and accessibility, was widely utilised across MoD, and used to support the generation of EP03 Options..

- b. Register of Equipment Capability Systems (RECS). RECS is a database that has been progressively populated with detailed equipment capabilities by platform, sensors, weapons and information systems. RECS is now available on MODWEB and linked to the ‘London Underground Map’ providing wide access to a diagrammatic representation of connectivity, and enabling users to drill down through platform and headquarters nodes from the London Underground Map to interrogate RECS for additional information on capability.
- c. Policy Development. RE601 has contributed directly to CM(IS) ‘Next Steps’ paper¹⁷, which outlines the route to delivery to the JCB.
- d. Promotional Activities. RE601 has provided extensive support to CM(IS) and DEC(CCII) to meet the specific needs to promote NEC. This has included:
 - i The NEC Flyer¹⁸ - a professionally published handout on a single sheet of A4 that introduces NEC, setting out the vision, benefits and core themes.
 - ii Developing promotional material in support of, and attending, CM(IS) Seminars to MOD, DPA, the research community and industry.
- e. Experimentation. RE601 has supported DAES on Experimentation.
- f. NEC 1* Steering Group. RE601 has supported the SG in the development of the NEC Action Plan.

INTERNATIONAL RESEARCH COLLABORATION

29. In developing the NEC Concept, RE601 has maintained the technical lead on International Collaboration on MOD’s behalf. Given the relationship between NCW and NEC, inevitably, much of the initial focus for collaboration was with the US. As a result of liaison activities undertaken in FY02, the NEC project has developed links with a number of US military research organisations, in particular with the Office of the Assistant Secretary of State for Defence (OASD) and the Office of Force Transformation (OFT) in the US.

30. However, the aims and objectives of NEC are aligned not only with those of NCW in the US, but also with developments in many other coalition nations including Australia, Sweden, Canada and New Zealand. Each nation has developed their own term for their version of the NEC concept, as illustrated in Table 3 below:

Table 3 - International Networking Terms

Nation	‘Networking’ Term
Australia	Network Enabled Warfare (NEW)
NATO	Network Centric Capability (NCC) [Note 1]
Netherlands	Network Centric Operations (NCO)
Sweden	Networked Based Defence (NBD)

¹⁷ CM(IS) D/CM(IS)/2/1 (195/02), NEC - Next Steps, Issue 1 dated 28 Oct 02.

¹⁸ NEC - The UK’s Programme to Enhance Military Capability by Better Exploitation of Information, v4.1 dated 22 Sep 02.

Nation	'Networking' Term
UK	Network Enabled Capability (NEC)
US	Network Centric Warfare (NCW)

Note 1: NATO is considering adopting the term Network Enabled Collective Security (NECS).

31. Amongst the liaison activities undertaken, the project has:
- a. Hosted a Bilateral Workshop with OASD(C3I) at Dstl Malvern in May 02.
 - b. Attended a Bilateral Workshop with OASD(C3I) at Monterey, CA. in, June 02.
 - c. Presented 5 papers at the 7th International Command and Control Research and Technology Symposium (ICCRTS) Conference on 'Enabling Synchronized Operations' at Quebec in Sep 02 on:
 - i Command Information Infrastructure and Sense-making.
 - ii Command considerations for UK Network Enabled Forces.
 - iii Acquisition Issues for Network Enabled Capability.
 - iv Interoperability - Some Aspects of Coalition Operations.
 - v UK NEC and Capability Development
 - d. Hosted Anglo-Swedish NEC Workshop at JCBM ARTD, Portsmouth West in Dec 02 focusing on Future Ways of Command, Metrics, Experimentation and Acquisition Issues.
 - e. Attended multinational Workshop at Washington in Dec 02 to consider Military Capability Packages (MCPs), Metrics.

LESSONS LEARNED

32. RE601 is endeavouring to learn from the successes and failures of previous major information systems (IS) initiatives including the Joint Command System Initiative (JCSI) and Joint Battlespace Digitization (JBD) in order to inform MOD planning for the successful delivery of NEC. The results of this are reported in the NEC Outline Concept Part 8 - Lessons Learned.

FUTURE PROGRAMME

RESEARCH OBJECTIVES

33. As part of the ARP13 realignment in FY03, RE601 - NEC System Concept is to become RE511 - NEC Delivery. DEC(CCII)'s Statement of Purpose¹⁹ for RE511 directs it to 'provide support to MOD (RD CCII, DEC CCII, CM(IS) and DAES) in':
- a. Developing the NEC Concept - 'developing and communicating a clear understanding of NEC, its benefits, implications and constraints'.

¹⁹ CCI-03-05-011 Request for Contract Action, Issue 0.01 dated 6 Mar 03.

- b. EP Intervention and Acquisition Support - *'developing strategies, mechanisms and plans to enable early and sustained delivery of NEC capability'*.
- c. NEC Research and Experimentation Support - *'ensuring coherence in research, experimentation and acquisition activities supporting NEC'*.

34. In essence, over the next three years, RE511 expects to be tasked with guiding the way towards the delivery of NEC and the planned research programme²⁰ to support this objective has been agreed by DEC(CCII). RE511 will have a pivotal role in facilitating pan-ARP and cross-capability activities on behalf of CM(IS), DEC(CCII) and DAES. Hence, it is essential that a clear and unambiguous procurement and technical strategy is established to ensure that the roles are undertaken effectively. The principal characteristics of the research project are as follows:

- a. Providing the operational and technical context to other ARP packages.
- b. Supporting CM(IS), DEC(CCII), DAES in the 'implementation of NEC Concept' across DsEC and ARPs, and working with stakeholders to provide guidance and technical advice on capability management issues emanating from the NEC Concept.
- c. Direct Support to CM(IS)'s Joint Requirements Co-ordinator (JRC) role.
- d. Participation of a wide range of stakeholders, in particular DGInfo D CBM/J6, DPA staff, doctrine and warfare centres;
- e. Maintaining the technical lead on behalf of MoD on International Collaboration for NEC, especially with the US.
- f. A Dstl led programme with industry and academia involvement to maximise leverage from other subject matter experts..

35. As RE511 represents DEC(CCII)'s main 'vision' project within ARP13, it must also retain an element of innovative concept development, hence it must also exhibit the following characteristics:

- a. Looking beyond current systems and concepts.
- b. Being innovative in nature.
- c. Providing the operational and technical context to other ARP13 projects.
- d. Drawing on underpinning research.

36. The following sections summarise the proposed key research activities within the three research objective domains.

DEVELOPING THE NEC CONCEPT

37. NEC is not a concept; neither is it a vision, doctrine or capability²¹. It is best described by the set of attributes that define how equipment capability must develop in order to deliver the aspirations of Joint Vision and SDR NC. Current work has identified 9 core themes (see Table 2) that provide a framework for the development of the NEC 'Concept'. The Outline NEC Concept [this family of reports] has been developed from these core themes. In FY03, the NEC Concept will be further refined, in concert with other researchers, in order to

²⁰ CCI-03-05-011 NEC Delivery Proposal, Issue 1 dated 25 Mar 03.

²¹ CM(IS) D/CM(IS)/2/1 (195/02), NEC - Next Steps, Issue 1 dated 28 Oct 02.

improve MOD's understanding of NEC, and its implications across all LoDs. The refined NEC Concept will be used by the NEC 1* Steering Group to direct the implementation of NEC. The principal strands of this research will be:

- a. Military Impact of NEC. The Conceptual Framework (against which all relevant NEC research, support and impacts can be measured) will be further developed. This will lead to a review and refinement of the NEC core themes to reflect feedback from across the MOD and beyond. The critical issues associated with each of the core themes will be examined in 'Use Cases' that set them within specific military contexts, and to stimulate debate within other ARPs.
- b. Technical and Management Support. RE511 will provide impartial advice and other as yet unspecified support to CM(IS), including assisting in his Joint Requirements Co-ordinator (JRC) role for NEC, to DsEC to address NEC issues that cross capability boundaries, to DAES, and to DEC(CCII) in his Core DEC role for C&I. This support will enable the ECC to develop a clearer understanding of NEC and its management and delivery in order to orchestrate trade-offs necessary to improve Defence capability.
- c. NEC Promotion. Building on promotion activities previously undertaken, the project will support DEC(CCII) by developing a Promotion Plan and promotional material. In addition to briefs, presentations and flyers, this will include development of an NEC internet site hosted on a suitable MOD server. This will promote a wider understanding and acceptance of NEC, its benefits, implications and constraints by all those involved in the delivery of military capability, including those organisations outside the MOD.
- d. Liaison with Coalition Partners. Since the aims and objectives of NEC are closely aligned with developments in many other coalition nations, discussions and liaison activities will be continued particularly with the US (including OASD but extending to the single Services implementing NCW), and also with NATO, Sweden, Australia and other TTCP partners. This will deliver improved exploitation of related work by coalition partners and improved understanding of other nations' positions and viewpoints, thus promoting enhanced interoperability.
- e. NEC Industry Forum. Early and progressive realisation of NEC will be heavily dependent upon early buy-in from potential strategic industrial partners. This activity aims to harness current industrial and academic thinking on NEC concepts and research to ensure that it is realistic and will lead to rapid and progressive realisation of NEC. Participation by UK-based European and American defence contractors will also aid collaboration with coalition partners.

NEC RESEARCH AND EXPERIMENTATION SUPPORT

38. NEC will only be delivered by the co-ordination of multiple underlying enabling activities, including research and experimentation. To achieve effective co-ordination, RE511 will actively develop a network of key stakeholders including Customer 1 and 2, the Defence Procurement Agency (DPA), and especially the IA, and related research and experimentation areas. The primary activities to be undertaken are as follows:

- a. NEC Research Co-ordination. Supported by the Conceptual Framework, RE511 will develop a Research 'Baseline' of potentially NEC relevant research, including Capability Technology Demonstrators (CTDs). The project will also endeavour to monitor relevant research by selected coalition partners in order to identify

opportunities for exploitation under IRC or similar agreements, and to aid in prioritising UK NEC research requirements. From these, NEC Research Recommendations will be developed. They will be used by DEC(CCII) to ensure that NEC related research across the whole RBB is coherent, mutually supportive, and leads to practical realisation. It will also inform DEC(CCII) on the strategy and future priorities for managing and co-ordinating future NEC related research within ARP13.

b. NEC Experimentation. This task will build on the work undertaken in support of developing the NEC Experimentation Strategy in FY02. The initial task will be to develop a register of NEC-related experimentation across the ARP. This will then be extended to include the CRP, DPA and any NEC related experiments planned by the JECC, Warfare Centres etc. The register will be analysed to identify links between experimentation and research. Opportunities will also be sought to improve co-ordination of NEC-related experimentation by supporting the development of experimental campaigns (with appropriate consideration of opportunities for joint NEC - NCW experiments) to conduct NEC-related experiments as a coherent set, supported by appropriate metrics. Experimentation recommendations will be developed to enable DEC(CCII) and DAES to co-ordinate NEC-related experimentation and to exploit intervention opportunities, thus improving coherence in NEC related experimentation and utilisation of the JCBM ARTD and NITE Works.

c. NITE Works Support. The Experimental Network Integration Test and Experimentation Works (NITE Works)²² is expected to add considerably to MOD's experimentation capability. However, since NITE Works is to be provided as an industry hosted facility, MOD requires assistance to ensure that it supports the needs of NEC through validation and experimentation of concepts and capabilities. RE511 will provide advice and support to the NITE Works Solutions and Concepts team via DAES and DEC(CCII) to ensure that the NITE Works experimental programme remains consistent with the long-term aspirations of MOD for increasingly NEC capable systems, and that it is able to validate and explore NEC Concepts

EP INTERVENTION AND ACQUISITION SUPPORT

39. The aspirations of NEC will not be met by acquisitions in a single programme or a small number of programmes. Although core information technology and C2 programmes will form the focus of NEC, the implications of adopting a shared information approach and presenting a coherent representation to all operators will potentially affect many interdependent acquisition programmes. Despite the desire for early realisation of the capability enhancements envisaged by NEC, the programme is too large, expensive and complex to be rolled out as a single acquisition. Instead, it will need to be delivered through multiple programmes that are phased over a number of years, hence achieving incremental enhancement of operational capability developing incrementally as different elements are provided or integrated. Management of this process will be a considerable challenge. Hence, MOD needs to develop policies on how to intervene in equipment acquisition programmes in order to deliver NEC. The major research and support activities are as follows:

a. Support to Acquisition Strategy and Process Development for NEC. Responsibility for delivery and maintenance of military capability rests with multiple stakeholders including Customer 1 and 2, DGSA, DPA (and especially the IA), DLO, DCSA and DG Info. As NEC cannot be delivered by a single programme, it will

²² Formerly known as Experimental Network Integration Facility (ENIF).

inevitably impact on existing programmes and projects. CM(IS), in his role as JRC for NEC, and DEC(CCII), as Core DEC for C4I, require mechanisms to ensure timely, incremental delivery of NEC without unacceptably impacting on the cost, schedules or capabilities of existing or planned systems. RE511 will assist MOD in the development of an Intervention Strategy to be used by the JRC as the policy for intervention in Capability Lifecycle Planning to deliver operational advantage from NEC in the short and medium term. The strategy will identify the activities required at various stages of the lifecycle and set out the responsibilities and methods for undertaking these activities. It will also address acquisition methods, especially within areas of scrutiny, contractual issues and industrial participation. Hence, it will provide practical guidance to enable DPA and DLO to meet the overarching requirements placed upon them by the JRC, and thus to ensure the progressive delivery of NEC.

b. Support to EP Management and NEC Requirements. The primary onus for identifying and improving a specific equipment capability lies with the DEC concerned. However, ensuring the coherence of the underpinning architecture is the role of the Core Capability DEC for C4 within the framework established by CM(IS) as the JRC for Interoperability and NEC. RE511 will assist DEC(CCII) in his Core DEC role in the generation of EP Options strategies that will deliver advances in NEC. Support will also be provided to CM(IS) in his role as JRC for NEC by assisting in the development of Key User Requirements (KURs) that support NEC, for use by other DsEC. RE511 will also support DEC(CCII)/CM(IS)/DEP in the wider development of the Capability Audit (CA) process to ensure that it properly reflects NEC, and that the NEC aspects of capability are reflected in future EP decisions. Also included is the provision of support and advice towards the development of a validated model of the military network to enable DsEC and Integrated Project Teams (IPTs) to understand and resolve integration issues, thus aiding delivery of NEC.

i Development of Capability Management Tool. As explained at Paragraph 28.a above, a Model of the NEC Network (aka the 'London Underground Map'), subsequently linked to the RECS database, has already been developed for CM(IS). The ECC now believes that this could form the basis of a core capability management tool.

RESEARCH MANAGEMENT

40. To achieve its objectives, a core Dstl team will be formed to provide the strategic direction for the project's activities. The team will comprise Dstl staff supported by appropriate specialists from QinetiQ and other industry as expedient. This will be in addition to the external support delivered through the Industry Forum. Additional expertise from outside the project will be harnessed through regular workshops and other technical fora.

41. The JCB and others attach great importance to NEC and the early realisation of enhanced capability as a result. This priority focuses considerable attention on a concept that is still in its early stages of development, and which is not fully understood. Delivery of NEC entails co-operation beyond the remit of DEC(CCII), even in his Core DEC role, or CM(IS) in his JRC role. Many of the research activities will require considerable interaction with authorities outside DEC CCII, including other DsEC, DPA (and especially the IA), DLO, DG Info CBM/J6 and JDCC. Hence, close liaison with relevant MOD staff will be essential to ensure that research does not become disconnected from the needs of the client, or the evolving requirements of MOD. It will also be necessary to ensure that recommendations

remain realistic and coherent with activities across other LoDs. This will be achieved through regular briefings of DEC(CCII), CM(IS) and other Customer 2 desk level staffs.

42. NEC research is to be undertaken by a number of projects across the ARP. Effective co-ordination measures will be put in place to build working relationships and establish trust between RE511 and other relevant REs within ARP13 and across the wider ARP. Furthermore, the project will endeavour to ensure that opportunities for collaboration with the UK's potential coalition partners particularly with the US single services responsible for implementing NCW, are fully exploited.