



## National Resilience Extranet Common Operating Picture

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# List of Contents

<b>ADMINISTRATION PAGE</b> .....	<b>2</b>
<b>LIST OF CONTENTS</b> .....	<b>3</b>
<b>1 COMMON OPERATING PICTURE</b> .....	<b>4</b>
1.1 Context.....	4
1.2 Introduction.....	5
<b>2 REVIEW OF THE AIM OF A COMMON OPERATING PICTURE</b> .....	<b>7</b>
2.1 Strategic Statement of Aim.....	9
<b>3 ACHIEVABILITY</b> .....	<b>10</b>
<b>4 FEASIBILITY</b> .....	<b>12</b>
4.1 Feasibility - Outline of Multi Agency User Need.....	12
4.1.1 Value of a Common Tactical Picture .....	15
4.2 Feasibility - Comment on Development of a User Requirement .....	16
4.3 Feasibility - Broad Assessment of Technical Options .....	18
4.3.1 Sample Solution.....	18
<b>5 RISKS AND GAPS (STRATEGIC RISKS AND MITIGATION)</b> .....	<b>21</b>
5.1 Primary Strategic Risk.....	21
5.2 Other Strategic Risks.....	22
<b>6 ASSESSMENT</b> .....	<b>26</b>
6.1 COP Capabilities .....	26
6.2 Candidate Implementation of COP Functionality .....	27
<b>7 CONCLUSIONS</b> .....	<b>28</b>
<b>8 RECOMMENDATIONS</b> .....	<b>29</b>

# 1 COMMON OPERATING PICTURE

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## 1.1 Context

The Resilient Communications programme is part of FY12/13 CTSTC decision support programme titled "Decision Support to NSC (O) (S&T) and to Cross-Government Collaboration on Counter Terrorism". In consultation with the Cabinet Office customer, the focus of this year's Resilient Communications programme is supporting communications during national crises. Research is required to support the acquisition of the next generation National Resilience Extranet (NRE).

The current NRE Service provides the UK's emergency responder community with a single, secure means of electronic information sharing. The contract for the current NRE Service expires during September 2013; a procurement is needed to continue the service. The Future NRE Service would address problems that arise from the fact that the Emergency Responder Community, which includes the "Blue Light" Services, Local Authorities and Essential Services, does not work on a common ICT system and the majority do not have access to secure ICT. This significantly inhibits effective and efficient multiagency working and information sharing as mandated in the Civil Contingencies Act 2004.

Three items of research were required to inform different aspects of the Future NRE Service.

This paper concerns the third issue. The objective was as follows:

*Provide de-risking advice on the feasibility of achieving a Common Operational Picture in the UK. Review the aims of the COP and improve understanding on how feasible it is against the current environment. Identify risks and gaps, and provide advice on how they can be addressed.*

This paper is structured according to the various elements of the task.

In this paper the term 'Common Operating Picture' has been used to substitute the term 'Operational' used in the project objective above.

The term 'Operational' has a number of interpretations and the multi-agency agreed UK terminology is 'Common Operating Picture' (UK Civil Protection Lexicon, version 2.01 Cabinet Office 20012).

The value of a Common Operating Picture has been examined previously in the context of UK multi agency emergency response; The principle study is comprehensive and the authors of this paper have not sought to replicate that work

“Common Operating Pictures and Their Potential for Multi Agency Work” McMaster and Barber, BAE Systems 2009 – reference HFIDTC/2/WP3.1.4/4.

## 1.2 Introduction

The NRE is described in the publication ‘National Resilience Extranet Capabilities’ (Ultra 2010) as intended to be used by “...all Category 1 & 2 Responders, Government Departments and Agencies and other key organisations in the UK resilience community to share knowledge, plan responses to emergency situations and manage incidents as they happen.”

It has been largely successful in the first of these tasks in the LRF areas where it has been adopted (e.g. Cumbria) where the ‘Collaborate’ elements of the NRE are a valuable tool (limitations of user functionality notwithstanding). It was also used with notable success during the London Olympics and Paralympics.

However, the value of the NRE to help “...manage incidents as they happen” has not been realised.

Analysis of the information available leads clearly to the conclusion that both the lack of widespread adoption of the NRE by LRF areas, by areas of government or national agencies and the inability of NRE to support ‘incidents as they happen’ is largely an outcome of functionality - primarily, in this context, not having an ability to present up to date, relevant and accurate information at point of operational need and in a readily accessible format– a Common Operating Picture.

For the Devolved Administrations consultation took place with Scottish Government; the attraction of a fully functioning NRE with a COP included and the limitations of the existing model were identified. The publication of the Wales Audit Office report ‘Civil Emergencies in Wales’ is also relevant.

The NRE ‘package’ that was offered by the incumbent service provider did contain additional tools and functions that could have provided more useful functionality to support incidents in ‘real time’. Users articulate two main reasons why these were not adopted: firstly they were only available as additional individual license cost which made widespread, multi-agency adoption cost-prohibitive, particularly where similar (though often not as capable) systems already existed; secondly the primary package, ‘Atlas Ops’, was an application that integrated a great deal more capability than was required for a Common Operating Picture and would have required significant restructure and integration of existing information management process in many agencies. It was also not clear to some users how ‘Atlas Op’s and ‘Collaborate’ would integrate information to a common platform.

Notwithstanding the considerable benefit to the multi-agency emergency response and resilience in UK of having a high quality information picture in support of

Situation Awareness is widely recognised both by existing NRE users and others. Similarly, the need has been referred to repeatedly in a variety of public reports in the UK and worldwide and the 'carry over' from military operations is undisputed. For example:

Recommendation 17, of the major national exercise Watermark (DEFRA 2011) made this clear:

*“The review recommends that government should consider how to use technology better for information sharing and reporting to inform the national and local responses. Government should consider using a live, simple (mandatory) common information platform to use for mapping, digital visualisation, media and other source information.”*

No detractors from the need for a COP were located during this brief research.

The strategic need is to include a multi-agency operational information capability as a core component of the next generation of the NRE is, therefore, firmly established. This has been recognised by the Cabinet Office and they commissioned this report, though MOD and Dstl towards that end.

In terms of the task of examining the *“feasibility of achieving a Common Operating Picture”* it may be concluded that an absence of established 'need' for a COP is not an obstacle to which needs to be overcome.

## 2 REVIEW OF THE AIM OF A COMMON OPERATING PICTURE

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The project task includes a requirement to "*Review the aims of the COP*". The 'Aims' of a Common Operating Picture have not been identified as a specific, agreed statement. The term is referred to specifically and in descriptive terms in many documents - sometimes being considered a process and elsewhere being seen as a product; but no single, agreed 'aim' has been identified which could be specifically reviewed. However, there is little real divergence in understanding of what a COP is or what it is designed to achieve - which may be considered as being encompassed by the 'Aim'.

All references to a COP include reference to is a means of presenting essential information specific to an emergency in a means which optimises access to, and comprehension of, that information. The sources of the information are disparate and users of the information are from a number of agencies and organisations - hence the emphasis in title of 'Common' and 'Information'.

The COP is usually, but not exclusively, presented in a graphical (mapping) format with associated text based information presented either alongside (accessible by screen 'tabs or buttons' or by accessing hyperlinked information from screen icons - hence the term 'picture'). It is a term commonly used in military environments. The information presented forms a substantial part of a responders 'Situation Awareness' which is also referenced in the 'picture' term but referring to a mental or cognitive 'picture' of a complex and fast changing environment..

The military application of the Common Operating Picture usefully distinguishes between a 'Common Operating Picture' and a 'Common Tactical Picture':

The Common Operating Picture is data that has a relatively long time span (numbers of minutes and hours): primarily physical landscape (e.g. roads, buildings), known location of threat or risk (e.g. incident location, contamination plume prediction), location of key Operational functions (e.g. Cordons, Command Post, RVP)

The 'Common Tactical Picture' (CTP) is data that is overlaid on a Common Operating Picture and relates to information with a much shorter short life span (seconds and few minutes): primarily movement of assets (e.g. location of teams or units), plotting of changing variables (e.g. location of a moving and hostile group).

The 'Common Tactical Picture' information is of very limited value in informing the multi-agency environment; The value of a CTP is mainly confined to use within agencies where the information is, indeed, highly valuable.

The Common Operating Picture as part of the NRE is not, therefore, a substitute for agency specific 'Tactical' information comprising GIS mapping, deployment capability or Command and Control mechanisms. Specifically the COP should not include minute by minute (second by second) automated tracking of deployment of resources or similar function. Indeed there is a degree of evidence that the inclusion of detailed resource information from multiple agencies can serve to actively diminish the real multi agency value of a COP.

However, during consultation for this paper it was recognised that some agencies which do not have access to a computer tool for managing resources, would value such a capability as part of the NRE - notably the smaller Local Authorities and voluntary groups. A means of providing that CTP capability as part of the NRE is considered below as an optional addition to a core Common Operating Picture.

The nature and detail of information required from a Common Operating Picture (see below) will, of course, vary according to the information 'User', and different 'Users' will utilise the information for different purposes. The core information presented as a COP in a UK multi agency environment, will be consistent across the user groups and can be predicted or modelled.

While a more detailed 'Information Study' would more accurately identify those information types experience in UK has demonstrated that the nature of the information is mainly, but not exclusively, represented best in a mapping (graphical) form. This is a similar experience to the military use. But that graphical (mapping) information does need to be supported by representation of information in a substantial text based element. Both the mapping and text-based information are recommended as not all information vital to good situation awareness is readily reduced to a graphical format. This is most acute when the COP is used in Silver or Gold Command functions or in use by government - in fact the balance between graphical and text information varies largely according to the 'seniority' of the user: for example ground based team leaders would use mainly graphical information of such elements as cordon lines, approach road routes, areas of risk and location of vulnerable people; at the other end of the spectrum the Cabinet Office Committee sitting in COBR would make most use of the text based 'CRIP' and use mapping information in support (see also Emergency Response and Recovery, section 2.6 Cabinet Office 2010).

The presentation of the text based part will also vary according to the incident and risk preparation. For example for known 'planned for' risks a specific text based Contingency Plan may be available and less specific information may be represented by a bespoke briefing document which describes information not adequately presented in graphical form (e.g. social or political analysis, community tension information, statements of Strategic Aim or Objectives).



In this paper the term 'CRIP' is often used to distinguish all substantial text based information. However it should be noted that this is an over simplification for the purpose of this report and there is substantial overlap between graphical/mapping information and more text based information. Indeed different means of presenting information to the end user are possible - for example mapping capabilities that are readily available make access to text information from mapping icons a simple operation.

For the sake of brevity the term Common Operating Picture (COP) will often be used to refer to a combined graphic (mapping) and text presentation of information.

## 2.1 Strategic Statement of Aim

The discussion above and after review of all available documentation and discussion with a variety of stakeholders leads to the conclusion that the high level statement of strategic aim of the Common Operating Picture, as part of the NRE, is best derived from a statement of aim relating to the next generation NRE as a whole:

For the NRE as a whole:

**“Embed a universal, resilient, secure, information platform to support Strategic and Tactical multi agency decision making, and Operational activity, at local, regional and national level before, during and following any identified emergency or crisis situation for UK resilience”**

For the Common Operating Picture

**“Provide a graphical (mapping) and text based Common Operating Picture capability as a core element of the NRE which offers a specified sub set of NRE multi agency information relevant to a single emergency and which is time limited by that emergency action. The Common Operating Picture information must be available in at least ‘Read Only’ configuration, in an intuitive easy to access format and be immediately viewable by multi agency responders at Operational level.”**

### 3 ACHIEVABILITY

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In order to achieve the purpose of the NRE to work across boundaries, between agencies and at a pan-national level it will be essential to achieve a level of standardisation of the information in a Common Operating Picture. While text based information can (and is currently) integrated from multiple sources into a single template for preparation of a CRIP it will be increasingly difficult and challenging to carry out the same exercise if information is presented in multiple different graphical (mapping) formats.

The present doctrine relating to the management of essential information is contained in Emergency Response and Recovery (see above). This will need to be expanded and to contain more detailed and prescriptive explanation and to contain recommended templates.

It is important to note that any way forward which replicates the current arrangement where each LRF is free to decide their own format in which information is presented would mitigate strongly against the effective use of NRE across or beyond LRF boundaries and also work specifically against the intention of the current Cabinet Office work to improve information interoperability between emergency services 'Joint Emergency Service Interoperability Project (the 'JESIP' project).

Similarly it would be important for all government departments to agree a standard format for information during an emergency or during recovery. Reporting up to government and between government departments (or between devolved administrations) is made considerably harder if a common format is not achieved.

At present some agencies have access to a graphical (mapping) capability and some of those make it available to multi agency partners. The NRE in the present configuration contains an element called 'Atlas Ops' which contains such functionality. The NRE is also developing a separate bespoke mapping capability known as 'NRE Maps' but this is presently only available as a development (beta) version.

Some elements of the existing NRE 'Collaborate' function are relevant to the text based CRIP providing a common template is agreed.

The Common Operating Picture proposed in this report would provide:

- Combined graphical and text information – see above
- Only information relevant to a multi-agency response
- Information presented in a standardised format (e.g. CRIP structure, Common Symbology and Lexicon terminology)

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- Intuitive ease of information access for the user

Note also that in this context there is an important distinction between the graphical (mapping) capability being proposed for the NRE and a full GIS capability.

Electronic maps are best regarded as being an electronic version of a 'standard' paper map. They show the physical features of the landscape; buildings, roads, trees etc. and may include overlay information like the locations of schools, hospitals and other planning information. Their primary purpose is orientation of the user on the ground.

GIS systems work on the underlying human or physical data and often output their data into the form of maps. They are analytical tools that handle large sets of digital data in a myriad of forms.

The graphical mapping proposed for NRE is an electronic map with 'overlays' of additional graphical information. The overlays may be produced either manually (by drawing or 'drag and drop' use of prepared symbols) or electronic overlays produced as the output of GIS systems operated by single agencies.

As an example consider an area of impending flooding: The NRE presents an electronic map of the area at risk; Staff at, perhaps, the multi-agency Silver level add detail to the map manually showing the agreed location of cordons, RVP, Command Posts and approach routes. An electronic overlay of areas of flood risk is provided by the Environment Agency and a separate electronic overlay of the addresses of vulnerable people is provided by the Local Authority.

The capability required to achieve a COP as part of the NRE already exists. It is not 'cutting edge' in technological or organisational terms. Most LRF areas will have a form of multi-agency information provision for adoption during an emergency and that can be altered to 'feed' a COP. It is valuable to add that the process of establishing a robust information process to publish a multi-agency COP is a detailed and well developed process and guidance is offered at a national level on a cross agency basis - ideally as part of the Guidance already published in support of UK Resilience.

## 4 FEASIBILITY

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### 4.1 Feasibility - Outline of Multi Agency User Need

There are three distinct groups of users in the multi-agency community:

- Emergency Planning Staff who have both a specialist role in developing and maintaining emergency plans and supporting key decision makers during an emergency
- Emergency and Incident Gold and Silver Command (including main agency control centres which both exercise that level of decision making in the immediate response and support senior officers/managers in Gold/Silver Command roles once those staff are deployed). For NRE development purposes this group may be considered to extend to Lead Government Department (LGD) and national/devolved government functions (e.g. 'COBR' type functions).
- Emergency and Incident Bronze Command and 'Sub Bronze' or Team Leader roles amongst multi agency responders.

The information required for the NRE to support these groups of users is firmly limited to that which is valuable to be shared with a multi-agency response. It is not part of the NRE remit to substitute for single agency information systems (but see below for Common Tactical Picture).

The information which is needed to be imported into NRE is therefore only a small sub-set of all the emergency information available in the primary agencies. For example: for a location of known serious fire risk the local Fire & Rescue Service will maintain a significant amount of information (building construction, nature of chemical hazards, location of hydrants, pre-planned fire fighting actions etc.). Only a small part of that information might be relevant to a multi-agency response; there is no need to share information which has no value to others. Indeed, to share the considerable volume of location specific blue light information with all NRE users (as has been suggested by a significant number of the 'User Community') would be seriously problematical and even counterproductive:

- It would be difficult for each 'User' to identify the information relevant to a multi-agency response amongst a mass of location specific information (e.g. Fire specific information could obscure important multi agency information)
- It would require significant time and staff (and/or duplication of effort) to review the information available and to identify that which is relevant to the multi-agency incident response;

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- Infrequent NRE 'Users' would not be able to navigate through complex information structures, layers of data and menus.

Similarly, particularly for 'front line' responders and those who do not operate an NRE access frequently, the COP must be presented in a way which maximises the value and speed of access obtained by individual users. It should be as easy as possible to obtain access but commensurate with the security requirements of the COP information. The need to present COP information at 'RESTRICTED' level might usefully be reconsidered - particularly as the information presented is updated so frequently and is limited in 'life' for the duration of the incident.

This would allow the equipment used and security protocols to be broadened considerably. At present only computers, which are pre-identified and configured correctly, can access the NRE; this would mitigate against wide agency emergency access. As an additional measure access could be limited by an emergency specific password, issued at briefing or by secure communication (e.g. Airwave) to ensure that people who are not involved in the emergency do not seek to access the COP information and compromise the information or overload system access.

The COP is therefore proposed to be a highly specific sub-set of information assembled deliberately from the multi-agency response and from information already stored within the NRE. It should be presented separately from wider NRE access and relate only to the emergency involved. Where there are two or more simultaneous emergencies or where one emergency has multiple and distinct operational locations it should be presented as separate and discrete publications.

This would be supported by a 'generic' collection of information required for reference by emergency responders which is not incident specific. This is also a sub-set of information held in the NRE. As a sub-set it may also be published at a 'Protect' level which makes it accessible from a wider range of platforms and as it presented in a simple information structure it is readily accessed during the pressures of emergency response. It may usefully be supplemented by emergency specific information: For example a local sub-set of the NRE Contacts List might be supplemented by emergency specific contact information such as Airwave designated Talk Groups, Silver Command telephone numbers etc. Similarly a Command Structure diagram and explanation might be valuable.

It is therefore necessary to provide emergency responders with clearly delineated information which is strictly and directly relevant to their needs and which is presented in a manner which maximises speed and accuracy of information access. Figure 4-1 illustrates how this may be achieved. The architecture suggested is predicated also upon a separate paper in this series.

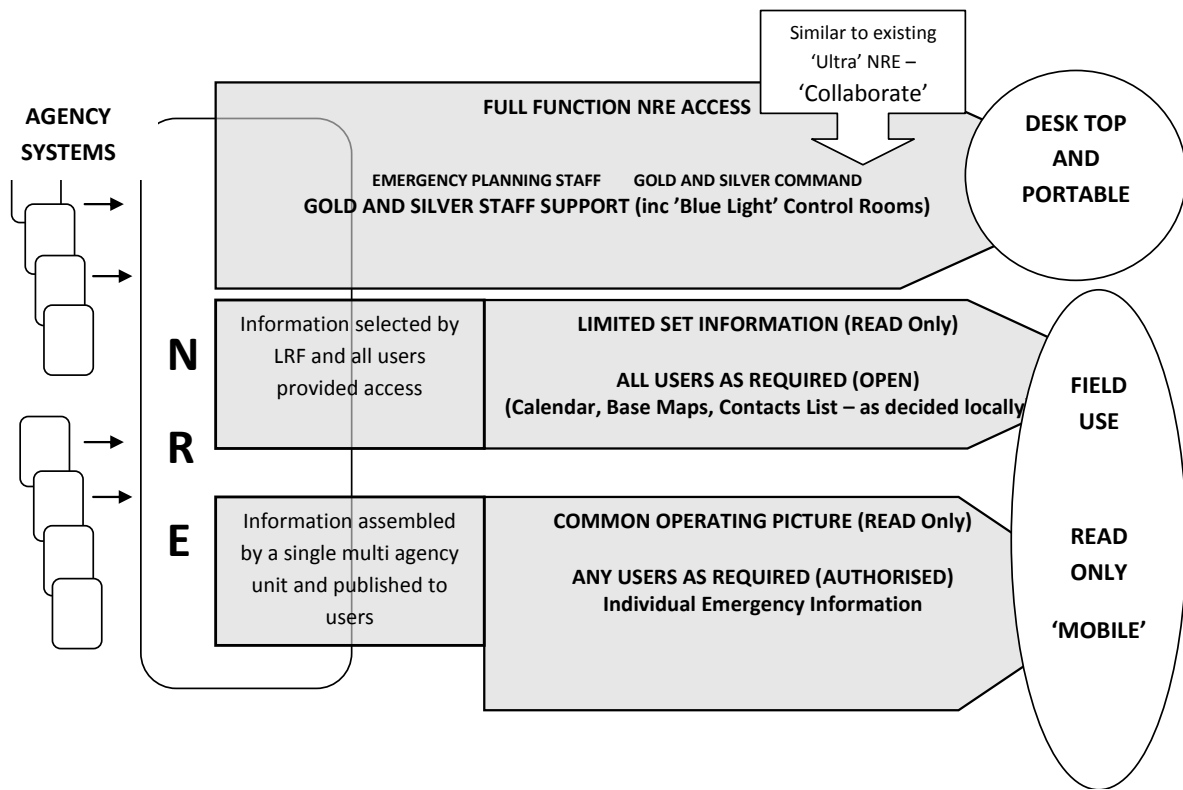


Figure 4-1 Candidate Architecture

In this configuration the NRE is able to create, for each separate emergency/incident, a packaged presentation of information specific to that situation in both a graphical (mapping) format and a text-based briefing. The offering will be capable of being created quickly – initially by ‘Control Centre’ staff and later by more skilled staff. The presentation must be in a familiar ‘standardised’ format (standardised means, ideally, a template agreed nationally) and utilise the recently published ‘Common Map Symbology’ and Lexicon.

This approach serves to “...link doctrine, terminology and the use of mapping in a way that promotes shared situational awareness” (Common Map Symbology, Cabinet Office March 2012) and supports both the Exercise Watermark recommendation (see above, Recommendation 17) and the government direction of development in response.

The standardisation of the Common Operating Picture product allows it to be adjusted as required for use by the different levels of user (Government, Commanders, Planners, responders etc.) while the core information remains. For example the focus for Gold and government would adjust the Common Operating Picture towards more strategic information while the Bronze level would require a

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clear operational focus. The core of the Common Operating Picture would however still be the information concerning the risk, mitigation and impact. Similarly COP information concerning multiple concurrent emergencies (or a single emergency with multiple locations) could most readily be combined if a standardised format and process is adopted.

The Common Operating Picture must also be constantly updated. Users must always only be presented with the most up to date information available and the 'Common Operating Picture' must show the date/time that it was updated. Copies of earlier information must be available to planning or Gold/Silver command support staff (and to post event audit) but 'front end' Operational staff must not have the immediacy of their decisions and action clouded by needing to differentiate 'old' and 'most recent' Common Operational Picture.

This implies that an agreed multi-agency process and capability exists to produce the Common Operating Picture. The process requires that information available from a multi-agency environment must be coordinated, consolidated and agreed at a single point. This will require local LRF agreement of detailed process and will probably involve the lead 'blue light' service adopting a single point role in the early stages of an incident.

#### 4.1.1 Value of a Common Tactical Picture

It has been outlined above that the core NRE Common Operating Picture product must not include detailed tactical information from responding agencies as it would serve only to mitigate Operational activity.

However, some agencies (notably the voluntary groups) lack the capacity to provide a tactical response support system where the real time location of specific assets is tracked. There may, therefore, be some value in providing a such tactical tool, at a basic level, as an optional element of NRE. The optional tool could utilise the architecture and functionality of the NRE and Common Operating Picture providing the information product that it produces is, in all circumstances, presented separately from the multi-agency Common Operating Picture.

The added value lies in two circumstances:

- For use by single agencies who do not have access to a resource management/deployment capability (notably small or voluntary agencies)
- Where joint agency teams are deployed (e.g. during flooding) where multi agencies require to track the location and status of the resource.

Note however, that simply integrating a 'Common Tactical Picture' into the core NRE incident specific Common Operating Picture offers a real risk of overloading the information user and of presenting confusing information which masks the core multi agency information required.

It is suggested that this only be available as a separate option, subject to separate license and payment arrangements. The system would probably require a high degree of automated information provision at significant cost without commensurate multi agency benefit to emergency management.

## 4.2 Feasibility - Comment on Development of a User Requirement

The separation of two levels of NRE access is described elsewhere in these reports. Briefly it is envisaged that the NRE will operate at two levels: 'Primary NRE' and 'Mobile NRE'.

- The 'primary NRE' will operate, as at present, with the full functions of the NRE system. It operates at a maximum of 'RESTRICTED' and is characterised by the existing 'Collaborate' functionality.
- The 'mobile' NRE will have 'read only' capability and operate at the level of 'Protect'. In addition only information directly relevant to a single emergency will be presented to the user.

The integration of multi-source information into a single Common Operating Picture will be carried out by staff operating the a 'primary' system (full NRE capability). A Common Operating Picture will be produced. This is a critical process as only information which is verified or known to be accurate must be included unless the information is presented as an agreed multi agency 'working assumption' (e.g. assumption that a road route over a bridge is unsafe during flooding) or as a 'prediction' (e.g. predicted area of flood risk).

The Common Operating Picture, once authorised, will be published both through the main NRE document store as well as into a much more limited 'Mobile' component of the NRE. Only the most current and recently published Common Operating Picture will be presented immediately and previous versions will be available only through archive. All users can therefore have direct, time specific access to the most up to date, multi-agency information available in the knowledge that only the most recently published version is presented to them. Each update will be time stamped so that users know how old the information is.

The core 'COP' can then be modified or added to for different levels of user (e.g. Gold Groups) and can be transmitted to other interested parties as a 'Situation Report' (e.g. neighbouring but unaffected geographic areas). In addition multiple



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LRF 'COP's which are produced to a common process and presented in a standardised format can be amalgamated by DCLG 'Red Teams', Devolved Administrations or COBR staff into consolidated versions which will inform regional or national decision making.

The content of the COP will require an NRE ability to easily assemble graphical (mapping) and text information from data which is transferred into the NRE data base by contributing agencies. The following are examples but the actual format would need to be specifically agreed:

- Base mapping of incident and at risk locations – with quick access shortcut to avoid users needing to pan and zoom a much wider map.
- Map overlay of the most immediate multi agency information in graphic form (with symbology if appropriate)
- Location and nature of risk or incident
- Position of cordons
- Location of key operating positions (e.g. RVP, Command Posts, Ambulance Loading Points etc.)
- Road and approach route information (e.g. Red and Blue routes)
- Separate map overlays (separate to avoid masking important information above) containing such information as follows:
  - Additional agency originated relevant information (e.g. Met Office information – wind direction, weather prediction; Environment Agency (or SEPA) information – flood prediction)
  - Decisions taken by Gold or Silver command (e.g. areas to be evacuated)
  - Implementation of any 'Warning and Informing' decisions
  - Text multi agency briefing document including the agreed multi agency tactical plan
  - Text 'Warning and Informing' information
  - Text Risk Assessment information

### 4.3 Feasibility - Broad Assessment of Technical Options

As outlined above and fully explained elsewhere in this report series, the Common Operating Picture functionality will be split between two different classes of device within the NRE:

- Primary systems – Devices with full functional access to NRE at 'RESTRICTED' level
- Mobile devices – Devices able to access only a controlled sub-set of NRE information on a 'read only' basis at 'Protect' level

Primary systems will publish and review the Common Operating Picture data using the main CWE web browser. Mobile devices (Smartphones and none Windows based tablets) will access the Common Operating Picture data via a specialised 'App' written for the specific platform in question. This 'App' will address issues of data security, intermittent connectivity and usability that would impede a pure web based solution.

Technical solutions exist to allow these different user interfaces to share the same data sources. Designed correctly, the majority of functionality would exist 'server end', allowing the rapid development and renewal of the user interfaces. Informational security will be aided by the use of a 2nd data portal used to host the 'Common Operating Picture' information thus separating it from the bulk of the RESTRICTED level data.

Cross-platform mapping application frameworks are available from a number of suppliers. Most of these frameworks already provide the core 'Common Operating Picture' functionality of electronic maps, clickable icons to view extra information and document readers. Current investigations imply that 3 different user interfaces (iOS, Android and Windows) will cover the majority of devices on the market and can be covered using the same basic web protocols.

Mobile devices (of all platforms) are undergoing rapid evolution in both interfaces and core functionality. A change plan will be needed to maintain these applications over the following years and to allow for market changes. Separating the 'Common Operating Picture' data from the main CWE avoids the requirement to recertify new devices and Applications, reducing program risk and cost.

#### 4.3.1 Sample Solution

A sample 'Common Operating Picture' application and supporting framework is included here to illustrate the flow of information in the system.

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The 'Common Operating Picture' is available under two main guises, a heavyweight web application running on a PC with supporting plugins and lightweight specialised 'Apps' running on the top 2 mobile operating systems (probably iOS and Android).

The PC based web application is part of the core Common Working Environment (CWE). The core planning data resides inside the CWE. It is accessible by users with desktop and laptop systems using different web browsers. Access is marked at RESTRICTED level, although most information on the system is actually at PROTECT or lower level. Users on the CWE have access to all information (subject to specific logon privileges) and will typically have read/write access to their own data.

Users on Field devices have access to an 'App' providing core functionality including baseline mapping provided by OS with data overlays feeding from data.gov.uk and other related sources. This is publically accessible data at the UNCLASSIFIED level. Standard incident response checklists and other supporting material are also available.

When a new emergency event occurs, a new 'Incident' workspace is created on the 'Common Operating Picture' data interchange portal (there may be multiple 'emergencies' concurrent in any LRF area). Emergency responders to the specific incident are given access to the COP workspace. User(s) on the main CWE can publish information into the specific workspace, including additional map layers, checklists and supporting documents. Information on the workspace is effectively 'read only' and is a Common Operating Picture of the information within the main CWE.

The act of publishing the data allows an opportunity to convert the information into formats that are easier to handle on a mobile device. Propriety document formats like Word can be converted into open formats like XPS or PDF and complex datasets like videos could be regenerated into formats requiring less bandwidth to view. The publisher should be able to review the data before it goes live on the incident workspace.

A simple workflow (see Figure 4-2) will aid users in the process of publishing data.

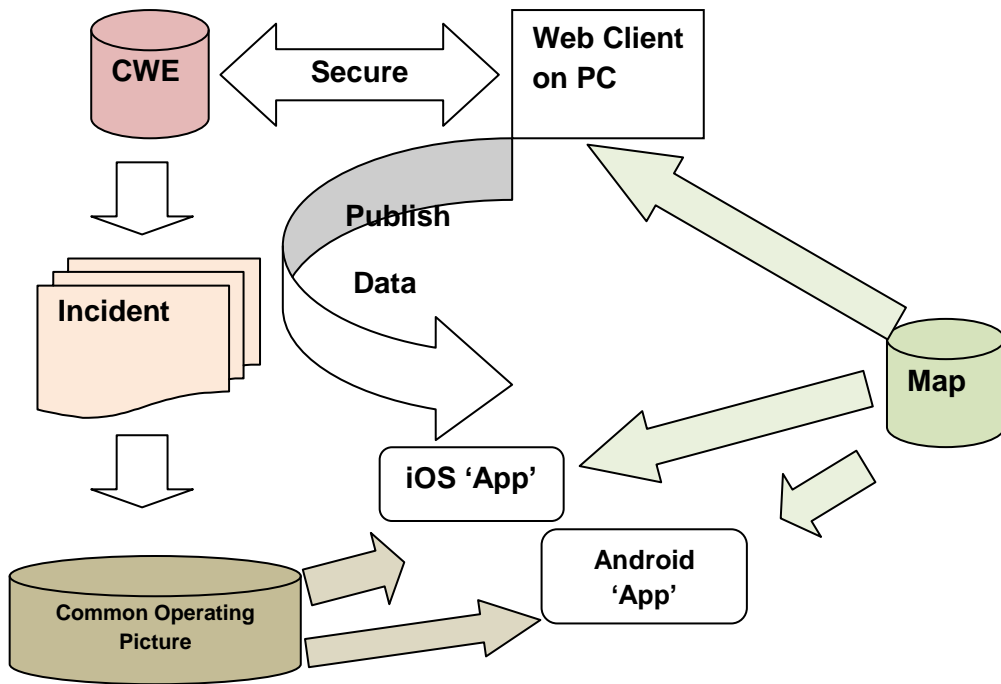


Figure 4-2 Technical Architecture

Mobile device users can now sign into the incident workspace, allowing them see the information, both as overlays on their electronic map and as supporting text information. The mobile device will poll the Common Operating Picture server at pre-determined intervals to see if information has changed. Base map data is streamed on demand but cached on the local device to avoid overloading the local mobile phone network.

Additional users can be brought into the system as required by allowing them to install the basic 'App' from an authorised portal and issuing them the appropriate password.

## 5 RISKS AND GAPS (STRATEGIC RISKS AND MITIGATION)

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The 'Risks and gaps' element of the task requirement is presented here as 'Strategic Risk' and associated mitigation. Though many of these are raised elsewhere in this paper it is important to separately identify the most strategic of risks involved in developing a Common Operating Picture for the NRE. They are summarised below here for completeness. In addition there is one significant risk, which deserves greater examination:

### 5.1 Primary Strategic Risk

There have, in recent years, been a succession of post emergency reports which highlight repeatedly the consequences of poor emergency services integration, inaccurate exchange or consolidation of information or poor decisions based on equally poor 'situation awareness'. The first NRE sought to address that Information challenge – and failed.

This iteration of the NRE, and in particular that element of the NRE used during the multi-agency emergency response, the Common Operating Picture, cannot be allowed to be implemented sporadically, lacking in common standards of information provision or doctrine. It would be a considerable national strategic risk if government departments, individual agencies or LRF areas are allowed to sit outside the NRE and Common Operating Picture capability or not to implement the national doctrine provisions or if NRE national doctrine is not developed.

It is appreciated that the issue of 'mandated' use is not welcome by government. But the fundamental issue remains that there may be a risk to life if this manifestly workable Common Operating Picture element of the NRE is not followed and appropriately resourced with both doctrine and capability.

There is now considerable evidence that poor 'Situation Awareness' has in the past, and may in the future, lead to loss of life; the importance of information management during emergencies is recognised by government (see Emergency Response and Recovery, Section 2.6). The link between risk to life during an emergency and the good situational awareness is now firmly established.

It may now, therefore, be considered that if the Common Operating Picture, as an integral part of NRE, is not taken forward as a deliberate and mandatory policy that government faces a strategic risk of challenge that it is in breach of statutory duty under the Human Rights Act 2000 to take reasonable and proportionate action to avoid life being lost.

The Human Rights Act argument is briefly:

- Poor information management/provision is firmly established as a cause of life being at risk
- The Government sought to address that risk by providing NRE
- The NRE failed in that aim because it was not taken up and varied in application
- and/or - Not taken up because use of the system/doctrine was not mandatory
- Human Rights Act 2000 – Positive public duty to avoid life being lost
- If life is lost because of poor Situation Awareness, and NRE (COP) not used, and/or not used because not mandatory
- The Government is vulnerable to challenge under Human Rights Act that life was lost because NRE (COP) not implemented and therefore government may be in breach of duty under the Act

**5.2 Other Strategic Risks**

Strategic Risk	Mitigation
<p><b>Information Quality</b></p> <p>Risk of poor decisions being taken, or inappropriate actions initiated, on the basis of Common Operating Picture information that was inaccurate or that the information was 'time expired' or incomplete</p>	<p>All information that is used to 'feed' a Common Operating Picture must be both quality assured and corroborated through a specific multi-agency agreed 'information gateway'. Direct information upload to the Common Operating Picture by 'front line' responders should not be possible as it is not quality assured.</p>
<p><b>Information Access</b></p> <p>Risk of poor decisions being taken, or inappropriate actions initiated, because decision makers were not able to access Common Operating Picture information, or relevant information was hidden by data that was not relevant or users were not able to utilise a complex information structure</p>	<p>Only relevant, up to date information should be presented in the Common Operating Picture which should be entirely separate from the remaining NRE information. Information access should be intuitive and straightforward.</p> <p>Common Operating Picture access should be presented separately from any other NRE information.</p>

Strategic Risk	Mitigation
<p><b>Information Security</b></p> <p>Risk of poor decisions being taken, or inappropriate actions initiated, because decision makers were not able to access Common Operating Picture information that was classified at a security level that did not provide access at point of need</p>	<p>The existing NRE security at 'RESTRICTED' precludes field access by commanders. The Common Operating Picture information should be separated from the base NRE security requirement and presented in a time limited, 'Read Only' format at a maximum of 'Protect' level.</p> <p>To support this each separate emergency should be allocated a separate, defined set of 'pages' for the COP and protected by a password which is allocated only at the outset of that emergency and passed to staff either at person to person briefing or by suitable secure communication (e.g. Airwave)</p> <p>A protocol should be developed to allow any NRE information which is at 'RESTRICTED' and relevant to decision making or action to be made available at a 'Protect' level, taking account of the balance between 'life at risk' and protection of information in a short timescale.</p>

<b>Strategic Risk</b>	<b>Mitigation</b>
<p><b>Information Integration</b></p> <p>Risk of poor decisions being taken, or inappropriate actions initiated in a cross border, multiple LRF or national emergency, because decision makers used Common Operating Picture information that was not properly or inaccurately integrated from different LRF areas, separate national agencies or Departments of Government</p>	<p>Develop a firm and universal UK doctrine which integrates within the NRE Common Operating Picture a standardised approach of single source:</p> <ul style="list-style-type: none"> <li>Map symbology</li> <li>Lexicon of terminology</li> <li>Template CRIP</li> <li>Standard presentation of COP information</li> </ul> <p>All Common Operating Picture information should be produced to a common (national) doctrine and text based supporting documents should use a common 'template' and use published national 'Symbology' and 'Lexicon'</p> <p>Local Common Operating Picture structures, text templates, terminology or symbology should be strongly discouraged.</p> <p>National doctrine to allow rapid integration of Common Operating Picture and supporting text information between LRF areas, across government departments or devolved administrations should be developed</p>
<p><b>Information Confusion</b></p> <p>National agencies, mutual aid staff, national utilities national and devolved governments misinterpret Common Operating Picture information which is not produced to a standardised national format</p>	<p>National doctrine should include the use of the 'UK Civil Protection Lexicon', and 'Civil Protection Common Map Symbology' as a requirement.</p> <p>UK and devolved Administration emergency 'CONOPS' and CCA Guidance should be rewritten to include a clear information structure for a Common Operating Picture" and text support information.</p>



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Strategic Risk	Mitigation
<p><b>Confidence and Continuity</b></p> <p>Operational failure is identified as being attributable to the next generation NRE and Common Operating Picture capability not being adopted or implemented effectively.</p> <p>The adoption of a Common Operating Picture approach is not allocated appropriate resource support at LRF or government level (there is a lack of confidence nationally about continuity and quality of the NRE as a whole)</p>	<p>If a Common Operating Picture is included in the next generation NRE it should be driven with confidence by government and accompanied by a commitment to seek national doctrine standards (as above) and agreement of primary agencies at a national level. 'Opt out' of NRE/Common Operating Picture should be regarded as a significant omission and strategic risk to local LRF resilience.</p>
<p><b>System Overload</b></p> <p>The next generation NRE fails during an emergency and information is not available to decision makers and the cause is identified to be that the NRE system was unable to accommodate the number of concurrent users and volume of data flow (ease of access and added value of the COP prompts considerable growth in the user base during a serious emergency)</p>	<p>The NRE system will need to be scalable both at local and national level so it can both accommodate exceptional demand in the short term and evolve over the medium to long term. Particular note should be taken of the mapping data as this will comprise of the bulk of the Common Operating Picture system and of rigorous configuration control.</p>
<p><b>Technological Surprise and Platform Support</b></p> <p>Risk of confidence in the system and system use being compromised if the devices recommended for access to the Common Operating Picture (e.g. tablet devices) become obsolete before the end of their 'mechanical' life.</p> <p>Mobile devices are in a period of rapid evolution. Major operating systems are on a 12 month release schedule and the market share swings rapidly</p>	<p>The core Common Operating Picture server end functionality must be fixed early in the design process to be capable of evolving over a long period of 'contract'. Supported access devices and the presentation of the data will need to evolve along with the host devices but ensure that supported devices can be used for a minimum of five years. A clear change management plan will be required from the providers.</p>

## 6 ASSESSMENT

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The Common Operating Picture, in both graphical (mapping) and textual form is a vital element of good 'situational awareness' upon which good decision making is based. The Common Operating Picture and the 'mobile' element of NRE described here presents information which is relevant, timely, accurate and easily accessed. Evidence from overseas, particularly in areas that have recently experienced significant natural disaster, illustrates the speed at which such 'COP' information systems are developing capability and the considerable value they add to emergency decision making.

The technical capability to deliver a Common Operating Picture as a core part of next generation NRE is available and accessible through UK suppliers. It is no longer emerging technology but is mainstream and available at cost which is affordable in the context of a national procurement.

In addition it is also clear that the provision of a technical capability (computer based graphics and mapping) no matter how complex or highly functional, is of little value unless accompanied by a well-developed information structure and associated doctrine which is shared to a common standard across jurisdictional areas and administrative groups.

The existing NRE, in concept, offers considerable benefit to multi agency emergency management – so beneficial, in the words of one very senior user, "it is so good that it cannot be allowed to fail". Yet the NRE has not attracted universal support amongst LRFs or government departments. It is suggested that a core reason for this was the limited ability of the current NRE to support real time multi agency emergency management which was a disincentive to invest the staff time and resource in adopting it.

The link between poor information management, poor decision making and loss of life is now very well established – not least by independent academic study and by repeated post emergency reports in both UK and beyond. There is an imperative that multi agency emergency action and command needs to be supported to avoid information led errors which involve loss of life.

The detail is summarised below:

### 6.1 COP Capabilities

- A Common Operating Picture (COP) is an extremely valuable tool for good situation awareness and high-quality decision making

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- The absence of a COP therefore risks impairing effective and efficient decision making, which could in some circumstances place lives at risk
- The technical capability to deliver a Common Operating Picture is readily available: several COP capabilities are available as commercial off the shelf (COTS) from UK suppliers, at reasonable costs.
- Most COP capabilities are scalable for application to contingencies at local, regional or national levels.

## 6.2 Candidate Implementation of COP Functionality

- COP functionality should be common across the NG-NRE, and available to all NG-NRE users.
- The COP should be continuously updated from a remote multi-agency location (Gold or Silver command support?).
- Information should be 'time stamped' so that the COP remains the 'best information available'.
- The COP should be at PROTECT level and Read Only
- The COP should present only information relevant to the incident to which the COP relates.
- The COP would benefit from a UK-wide process and doctrine (inc. the published Symbology and Lexicon).
- The COP functionality should be able to manage and present COP data from multiple emergencies simultaneously, though presenting to any one user only one COP at a time.

## 7 CONCLUSIONS

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This report therefore concludes that a Common Operating Picture capability, incorporating both a graphical (mapping) presentation accompanied by text based information is now an essential element of UK resilience. The provision of a Common Operating Picture as part of the next generation of the NRE is both technically and organisationally feasible. The cost/benefit is considerable. Equally the risk of not taking the proposal forward also carries significant risk.

The conclusion is summarised as follows:

- The NG-NRE would benefit from the inclusion of a core (non-optional) COP functionality
- The COP would provide considerable benefit to UK resilience
- Such a COP should present information, in an accessible, readily-assimilated form with functionality that is capable of use by all of the Resilience Community, even staff unfamiliar with emergency management or the detailed functionality of the wider NRE system.
- The capability gaps being addressed by the current JESIP programme would be partly mitigated by the presence of an adequate COP functionality

## 8 RECOMMENDATIONS

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It is recommended that:

- In creating the requirement for the NG-NRE, the Cabinet Office considers the benefits and costs of including a scalable COP functionality as a core component
- The Cabinet Office considers sponsoring the creation of a national doctrine and process for the use of the NG-NRE COP functionality as an element of 'Emergency Response and Recovery' Guidance.