

## Assessing the transmission of Command Intent

Geoffrey Hone Ian R Whitworth Andy Farmilo

Cranfield University at the Defence Academy of the United Kingdom, Shrivenham, SN6 8LA UK  
ghone.cu; afarmilo; @defenceacademy.mod.uk i.r.whitworth@cranfield.ac.uk

### *Abstract*

One key requirement for success in any military operation is that the Intentions of the Officer in Command be accurately transmitted down through the command hierarchy. It is these intentions that should convey the commander's requirements for the proposed operation, and should include a statement both of the purpose, and of the required outcome of the operation about to be undertaken. Without the accurate transmission of intent, the desired effect may well not be achieved. This paper will discuss a two-stage process directed at assessing the transmission of Commander's Intent, and which also has potential as a tool for de-risking a proposed operation. There is a further potential for use in the training of junior officers and cadets.

### **INTRODUCTION**

The passage, or flow, of orders, down through any command structure, has been described by Bateman (1998) as the RUDE Cycle (Receive, Understand, Disseminate, Execute), with the same RUDE process occurring at each stage down the hierarchy. It follows from RUDE that, at each level below the top command level, a subordinate commander must carry out the first three components and then prepare for the fourth. Thus, if a Commander carries out an assessment of the orders handed down by his direct subordinates to their subordinates – that is to say: at two levels down from his own – then the Reception, Understanding and Dissemination components can form the basis of a framework for that assessment. If the hierarchy is sufficiently large, “three-down” assessment may be possible. A tool for the assessment by the Commander of lower level orders is currently being developed, but validation of this tool in real or simulated exercises is seen as essential.

Given validation for such a tool, enabling a commander to assess the RU&D components of command transmission, it will then be logical to move to the second stage. This is seen as the establishment of such measurable variables as may occur in the order communication process. Potentially, there are several quantitative measures – taken from cognitive and social psychology - which may be applied to any communication (ranging from simple length and frequency of messages at one end, to the volume of material (words, sentences, the number of pages used for an order, etc) at the other). Work done by English and Guppy (1994) indicates that the more effective tank crews use fewer communications. However, it has not yet been established if this, or indeed the more general measures, can be directly applied to all military activity.

Once a validated method of assessing communications as “Orders” can be established, the way is open to sample a range of potential variables: this in turn should enable some correlations to be made to establish which variables or measures are appropriate and relevant. When the applicable measures have been identified, suitable tools can be generated to facilitate their rapid application. A generic toolset for the elicitation of this form of knowledge has already been prototyped, and examples of its application, to the two stages above, are given below.

A further stage, currently being considered, is dependent on the stages above. This would relate communications events to the set timeline for an operation. Plotting the exact timings for the issue of Warning, CONOPS and Confirmatory orders against a baseline from “Start” to “H-hour”, should highlight the exact nature of the order transmission process, and indicate where any current flaws might lie.

## **THE FUNDAMENTAL COMMAND STRUCTURE**

Most military organizations follow the hierarchical model of command (in Western Europe, the Swedish army have attempted to move away from this). The approach now to be outlined does require some form of standard notation and descriptors if it is to be generally universal in application. We refer to our top-level Commander as “CMD”, and then to his direct subordinates as SUB1, their direct subordinates becoming SUB2 and so on. In reality, there will be only a few levels below our CMD, but these may vary from nation to nation and from unit to unit. To take one example: a British Brigade Commander may have two or three Battle-groups (BG) under his command. Each BG Commander will have (perhaps) two Infantry Companies and two Squadrons of Armour at his disposal. Each Company or Squadron will have two or three Platoons or Troops, each made up of individual infantry sections, or individual tanks. With regard to formally promulgated orders, there are only four levels of command, in the UK, that may need to be considered in detail, if we take a Brigade Commander as CMD.

If our notional CMD has issued a set of orders to his SUB1s, then this same CMD is the ideal person to establish if his intent has been correctly transmitted. It would seem logical that the CMD can assess this by a study of the orders passed down from SUB1s to the SUB2s (and – where possible - SUB2s to SUB3s). In the case of the British command structure (and assuming CMD to be Brigade level), this offers three points – with Brigade as the top level, the points are

- 1: BG,
- 2: Company / Squadron,
- 3: Platoon / Troop

at which orders can be assessed for “transmission of intent” on the basis of how the original intent has been passed down the command structure. This is similar to the children’s party game “Chinese Whispers”, but with the originator being able to observe (without amending) the message as it is passed down. The basic command hierarchy is shown in Figure 1 (below), and the potential assessment (or observation) points in Figure 2 (below). A tool to facilitate the qualitative assessment, by a Commander, of lower level orders is currently being developed, but has yet to be validated.

In terms of application, we envisage a situation as in Figure 2, where a Brigade Commander (CMD) issues orders to the Commanders (SUB1) of each of two Battle-groups (or BGs). Each BG Commander (SUB1) will then issue orders to probably four Company or Squadron Commanders (SUB2); these will in turn issue orders to a number of SUB3s. Our originating CMD can now assess:

- Orders SUB1 to SUB2
- Orders SUB2 to SUB3

Additionally, SUB1 can assess the orders from SUB2 to SUB3.

This enables the checks as shown in Figure 2. The CMD can assess (say) 8 sets of orders issued by the BG Commanders, and (say) 24 sets issued by the Company or Squadron Commanders. The BG Commanders will also be able to assess the notional 24 sets of orders issued at Company or Squadron Commander level.

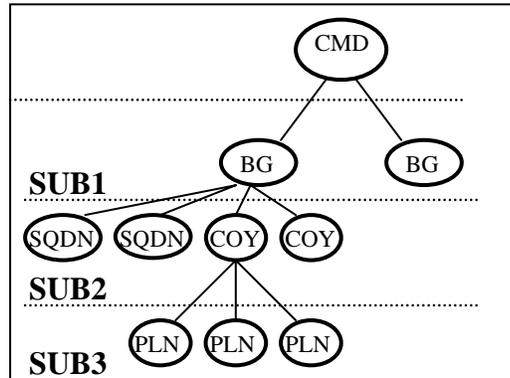


Figure 1: Basic Command Structure (After Whitworth, Hone, and deLooy-Hyde 2007)

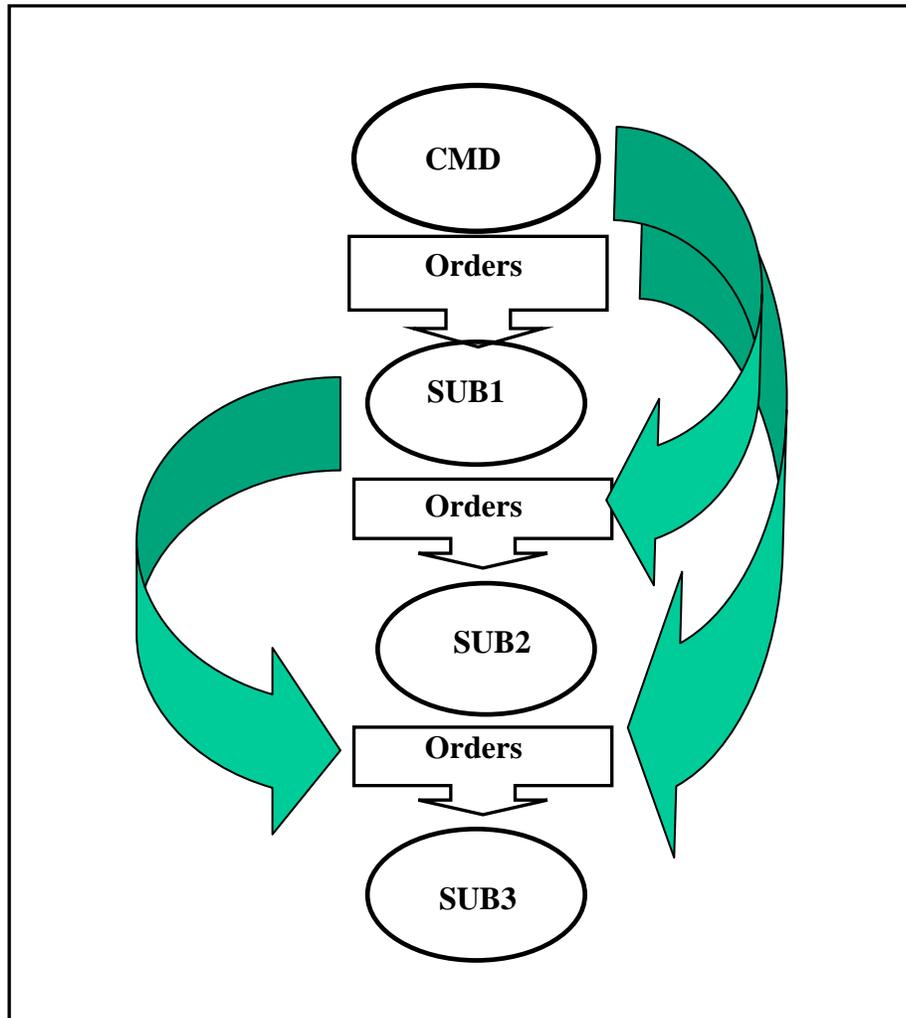


Figure 2: Scope for Order Assessment

The first-step assessment may indicate the accuracy of the transmission of the original Orders, and of the Intent therein, and will probably give a reasonable indication of where errors may have entered the order system. It may not give any instant indication of why those errors have crept in.

A typical (indeed, fundamental) question in this area is:

*Did SUBs show clear commitment to the Orders passed down to them?*

Two points relate directly to this question:

- a. This will require a military Subject Matter Expert (SME) judgment – and a Brigade Commander should be such an SME.
- b. The phrasing of this question may require revision, as is shown in the discussion of the assessment tool.

## QUANTITATIVE MEASURES

British forces generally follow the 1/3-2/3 rule. This holds that any Commander takes 1/3rd of the available time (to H-Hour) for his own order generation process, while leaving 2/3rds for his subordinates. This 1/3-2/3 rule flows on down the command structure, with the end of each 2/3rd period terminating at H-Hour. This has as one immediate effect that as orders pass down the command chain, they become more “mechanistic”. During a Commander’s “1/3rd” period, one or more Warning orders may – indeed, should - be issued (the first warning order is to be issued in a “timely manner”), followed by expanded warnings or Operational Concept (CONOP) orders, ending with a Confirmatory or Final Order. This process offers the opportunity to obtain values on a number of measures.

Assuming that some Higher Authority has required our Brigade Commander (CMD) to achieve a specific effect by a given time, we have a practical duration time for the line from “Start” to “H-hour”. Along this time-line, several events can be plotted:

- a. Exact time for the issue of each Warning order.
- b. Exact time for the issue of a CONOP order.
- c. Exact time for the issue of the Confirmatory order.

This can be done at each level of command. Furthermore, every instance of a SUB, of any level, seeking explanation of any point in his orders can also be plotted, and related to the basic timeline events. Combined with the evaluation of orders issued at one or two levels down (as Figure 1) this would provide data on the best use of available time as related to the transmission of intent. It may also prove instructive to relate any messages sent up seeking clarification of the Orders on points relating to (e.g.) the timing, frequency and volume of intermediate orders, to the CMD detailed assessment. The performance of each planner may depend on how long it took to recognize a need for clarification.

There are some further measurable variables (quantitative measures) that could also be used. These relate to the actual transmission of orders, and should be considered as independent of the method of order transmission. Typically, these could include:

- a. Length of the order (in pages, words, characters, or transmission time, for example).
- b. Length of each sentence.
- c. Number of sentences.
- d. Time for each query (if any).

The findings of English and Guppy (1994) as mentioned above, suggest that the more effective tank crews use fewer communications, but it is far from clear if this, or a more general measures, can be directly applied to all military activity. It is possible that, in this example, the more highly trained crews did not to seek clarification, and were better able to anticipate within the command process. Another tool, to facilitate this approach (and which can be used to determine the effectiveness of any proposed measures) is also being considered for development.

## THE RESEARCH PROTOCOL

### Terminology:

The top-level commander is termed CMD, those sub-commanders – one, two or three levels down the command hierarchy – are termed SUB-1, SUB-2 or SUB-3. The Orders given by CMD are termed O, those by the sub-commanders becoming O-sub-1, O-sub-2 and O-sub-3 respectively. The relationship, and a proposed notation, is shown in Table 1.

Brigade <b>Bde-CMD</b>		Battlegroup <b>Bde-SUB-1</b>	
	<b>O</b>		<b>O</b>
Battlegroup <b>Bde-SUB-1</b>		Company <b>Bde SUB-2</b>	
	<b>O-sub-1</b>		<b>O-sub-1</b>
Company <b>Bde SUB-2</b>		Platoon/Troop <b>Bde SUB-3</b>	
	<b>O-sub-2</b>		<b>O-sub-2</b>
Platoon/Troop <b>Bde SUB-3</b>			
	<b>O-sub-3</b>		

Table 1: The proposed notation.

It seems clear that some form of notation will be required to apply this in the interests of simplicity and standardization. That outlined here may not prove to be the best, but does serve to show what is needed. If, for example, a Brigade Commander is called Bde-CMD then

- the Battle-group Commanders are Bde-SUB-1s
- the Company/Squadron Commanders are Bde-SUB-2s, and
- the Platoon/Troop Commanders become Bde-SUB-3s.

If, however, a Battlegroup Commander is BG-CMD, then the Company and Platoon Commanders become BG-SUB-1s and BG-SUB-2s respectively. The Orders given by each of them are numbered to reflect this. From this, any references to “Two levels down” or “Three levels down” must always be taken as referring to the specified CMD, independent of the rank held by that individual.

There are several different types of Order, issued at different stages during the planning of an operation, and it can be considered as critical that the assessment of different levels must always be at the same stage. The obvious start point is the initial Warning Order. Thus, CMD can assess O-sub-1, O-sub-2 (and perhaps O-sub-3), while SUB-1 can only assess O-sub-2 (and perhaps O-sub-3). In the context of an exercise, the assessment should be done as soon as possible after the respective Orders

have been issued. It is also important that elapsed time at which each set of orders is issued is recorded. A form of notation, as outlined above, to identify the individual orders and the person issuing them will be critical, and it is envisaged that this may have to vary so as to reflect the type of combat structure being assessed.

### **Assessment:**

This is carried out by each commander at two and (as appropriate) three levels down, and is carried out using the Assessment Tool being developed from the Cranfield Cognitive Toolset. This tool (the OSD Tool for short) – based on the principle of the Osgood Semantic Differential (Osgood, Suci and Tannenbaum; 1957) - facilitates a short computerised survey, in which the Commander's responses are directed at one question, or a sequence of questions. The two-step survey takes the form of a single question assessment of each Order (2 or 3 levels down as appropriate) followed by a short detailed question set (probably 5-7 questions in total), which is again applied to the issued Orders. The assessing Commander will not be able to see any of his previous responses. The tool is discussed in more detail below

**The first step** is a single assessment of each Order, as issued by each sub-commander (two or three levels down as appropriate), by the CMD, with one question only being asked:

***“Do these Orders use the available forces to best serve my Intent?”***

The question may not be phrased in this exact manner, as shown below. The answers form a baseline assessment to which all subsequent assessments can be compared. When the first step has been completed, the second can commence.

**The second step** is a detailed assessment of the Orders issued by each sub-commander, and requires CMD responses to a standard set of questions.. It is hoped to limit the question set to around seven items. If possible these items will be linked to the headings of the Five-Paragraph Model of Orders (Situation, Mission, Execution, Service Support, and Command & Signal) used by both the UK and US forces, and which is also a NATO standard (NATO; 2004). It will be seen below (Table 2) that the first three heads are identical for Five-Paragraph and Four-Paragraph Orders. A further target is to make the question set independent (if possible) of the arm of service being assessed.

In UK practice, Commander's Intent is specified as part of the three following headings:

**Situation** (with particular reference to Friendly Forces)

**Mission** (implicitly)

**Execution** (as the first item in Concept of Operation)

<b>UK OPORD</b>	<b>US 5-Paragraph</b>	<b>US 4-Paragraph</b>
<b>Situation</b>	<b>Situation</b>	<b>Situation</b>
<b>Mission</b>	<b>Mission</b>	<b>Mission</b>
<b>Execution</b>	<b>Execution</b>	<b>General Instructions</b>
<b>Service Support</b>	<b>Service Support</b>	<b>Special Instructions</b>
<b>Command &amp; Signal</b>	<b>Command &amp; Signal</b>	

Table 2: Order Models – UK/US

## TOOL DEVELOPMENT

The example question (repeated below) is technically termed a dichotomous-choice question, and can only have a response limited to YES or NO, while the Assessment Tool seeks to determine shades of opinion. This will require that the questions be phrased in a less constrained manner. The question:

***“Do these Orders use the available forces to best serve my Intent?”***

would need to be re-cast so that it cannot be answered YES or NO, and will take a form resembling:

***“To what degree do these Orders use the available forces to best serve my Intent?”***

The recast question can then have two descriptors:

***“Badly”***

***“Very well”***

so that a wide choice of position between the two descriptors is now possible

In use, the OSD Tool presents the basic question above a continuum between the two descriptors. The respondent is asked to indicate his/her assessment by dragging a pointer (taking the normal Windows form) along the continuum (using the mouse “click-and-drag” function), and then clicking on a button when they are satisfied that the pointer is correctly positioned. The starting position is shown below in Figure 3.a and a typical response in Figure 3.b. Since the respondent is asked to take a position between the two descriptors, rather than having to choose a given point on an arbitrary scale, the response will be fast, and no less accurate than a forced choice. Software development is taking place on desk-top and laptop PCs, but it is intended that the survey tool will be able to run on PDAs.

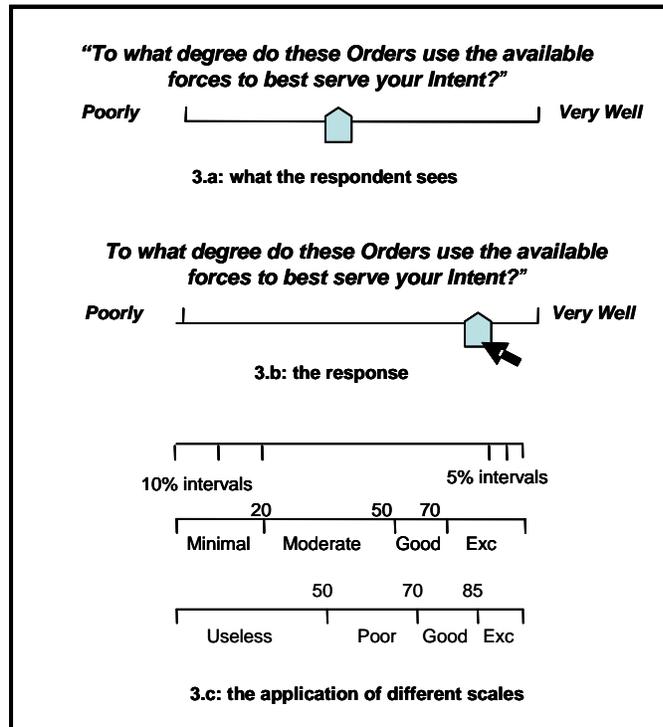


Figure 3: survey inputs and hidden scales

From the viewpoint of the researcher, however, the continuum shown in Figure 3.a actually conceals a multi-point scale. This scale has a potential range of intervals from 2 to 100, this in turn permitting the use of several statistical analysis approaches. Further, while the scale is initially an equal interval scale, the data can be exported in a form acceptable to modern databases and spreadsheets (we prototyped with Excel) and then related to an unequal interval scale. This, in turn, permits a non-linear relationship between the two descriptors to be explored.

The ability to transfer data to a spreadsheet offers a number of benefits:

**First:** This enables the use of templates that can facilitate our multiple correlations. This will be of particular value when comparing overall assessments to detailed assessments. Since the scale intervals and their labels are determined *post hoc*, the process can be repeated until a good fit with the original responses is obtained. This, in turn, will serve to provide some measure of validation. It should be particularly easy for the researcher to compare the overall assessment with the detailed assessment on a numerical basis, and then to identify potential anomalies, within the individual CMDs assessments (2 levels down), and between the assessments for level 2 and level 3.

**Second:** This may also facilitate the identification of any particular problem areas at the O-sub-2 level.

**Third:** This facilitates the use of other templates that can grade each instance of O-sub-2 separately, even to the extent of generating a colour-coded rating. Such gradings and ratings will have to be related to an unequal interval scale, and the validation of such a scale would be required before any high degree of confidence could be placed in the rating. The use of colour coding (and particularly the Traffic Light model or Red-Amber-Green) is used elsewhere in the military, as a way of offering a fast warning without the need for an observer to evaluate numerical data.

We consider that a number of pilot studies will be required before any unequal interval scale can be determined. Further, it is unlikely that any firm relationship between any scale labels and scale points can be pre-established, although we feel that the two examples shown above in 3.c may well be representative. The establishment of a generic (non-linear) scale must logically wait on completion of the second stage.

The second stage must be dependent on data from the first stage assessments. Given this, it will become possible to evaluate a number of measures (as quantitative variables) based on the cognitive and communications psychology literature. Some examples of these variables have been given above. One would expect that there would be a high correlation of the numerical values of these variables with good or bad CMD assessments. For example, a SUB receiving a good CMD assessment may have made fewer clarification requests than another SUB. This would, in turn, enable the identification of any variables that would serve as indicators of potential problems in transmission of Intent, and may even identify key events that could predict future performance.

Provided that the CMD assessments and the data from identified variables is kept separate, the variables would almost certainly be usable on direct CMD-SUB orders. Interpretation of the relationships would, however require some degree of SME input. The judgement of the military value and correctness of an order must be a matter for military judgement. Quantitative measures that can be correlated, both with each other, and with the success or failure in respect of obtaining the required effect, should not need any military validation, although this will remain desirable.

It can be seen that the first step requires much of the research effort, while the second step offers a potentially high return in data. At the time of writing, most of the work for the first step has already been completed, prior to formal trials.

## **DE-RISKING**

Risk is generally seen as an assessment of the probability that “things may go wrong”, combined with an assessment of the possible cost if they do go wrong. For much human activity – including military activity – risk analysis is focused on specific areas. The US Army Combat Readiness Center, for example, has concentrated on accident prevention as an effective way of preserving combat capability (CRC 2007); and the Information Organisation known as Globalsecurity.org has developed a series of matrices for assessing the risk of fratricide (Globalsecurity.org, 2005) in conjunction with the Combined Arms Command, Ft Leavenworth. A more general view of risk as applied to military operations was put forward by Krueger (1988) in his analysis of the Italian campaign in WWII. We believe that our approach to Order assessment will enable subordinate commanders to quickly assess the Orders that they receive for potential problems, which in turn will enable a rapid (though possibly informal) risk assessment for the proposed operation. This may involve changes to the wording of the question set, but not to the focus of each question. In the examples below (Table 3) the questions have been deliberately reduced to the dichotomous form in the interest of simplicity, and to enable comparison.

<b>CMD</b>	<b>SUB2</b>
<b>Were Orders issued in a timely manner?</b>	<b>Do you have sufficient time to plan/execute orders?</b>
<b>Was Urgency well conveyed?</b>	<b>Was Higher Command Intent (or intended effect) made clear?</b>
<b>Were Locations (AA, FUP, etc) clearly indicated?</b>	<b>Were Routes and Locations clearly indicated?</b>
<b>Are waypoint timings achievable?</b>	<b>Are waypoint timings achievable?</b>
<b>Are available forces well used?</b>	<b>Do you have adequate support and flank cover?</b>
<b>Is artillery support de-conflicted?</b>	<b>Are you happy with artillery support?</b>
<b>Are movement bounds clear and unambiguous?</b>	<b>Do advised bounds present any problem?</b>

Table 3: CMD versus SUB assessment

As the procedure and the questions underlying each question set (or sets) become validated, it should now be possible to extend the assessment procedure to the point where the SUB (any level) receiving an Order can evaluate the contents as indicated above. Table 3 (above) shows one possible set of variations in the basic questions, as applied to CMD and a SUB2.

## **OFFICER TRAINING**

Much of the training of Officer Cadets and Junior Officers is directed at instilling into them a portfolio of operational procedures that they should follow. The preparation of Orders is one such procedure, often with the trainees being required to prepare orders at levels above their own. The use of a standard assessment tool should facilitate training in Order preparation, in that it will be seen to be fair and unbiased, and will, therefore, probably be better received by trainees.

## **CONCLUSION**

The procedure outlined above offers a two-stage approach to the assessment of the Transmission of Command Intent. While it has not yet been validated using realistic command or planning exercises, it would appear to offer a useful framework for extending the present largely qualitative approach to assessing command intent. The Order Assessment tool referred to above has been prototyped using a generic toolset, originally developed for the assessment of Human-System Integration, but which was designed to permit great flexibility of use. This, the Cranfield Cognitive Toolset, has already been used for course assessment at the Defence Academy of the UK, and been shown to be an effective way of collecting data. Other uses for the Order Assessment tool are seen as in the de-risking of operations and in Junior Officer training.

## REFERENCES

Bateman, R., (1998) Avoiding Information Overload, *Military Review*, Jul-Aug 1998. Downloadable from <http://www-cgsc.army.mil/milrev>

CRC (2007) US Army Combat Readiness Center. Via <http://crc.army.mil>

English, N. and Guppy, A. (1994) *The adequacy of AGPT to support tactical training: a user evaluation survey*. Farnborough, Hampshire: The Army Personnel Research Establishment, Working Paper 8/94

Globalsecurity.org (2005) *Fratricide Risk Assessment*. Alexandria, VA.: Globalsecurity.org

Krueger, D. W. (1988) **Calculated Risk? Military Theory and the Allies Campaign in Italy, 1943-1944**. Fort Leavenworth, KS: Army Command and General Staff College.

Nato (1994) *STANAG 2014: Operations Orders, Annexes to Operations Orders, Administrative and Logistics Orders* Brussels, NATO (relates to US Army Form AF71-2, and the UK Staff Officers Handbook)

Osgood, C.E., Suci, G., & Tannenbaum, P. (1957) *The measurement of meaning*. Urbana, IL: University of Illinois Press

Whitworth, I.R., Hone, G.N. and de Looy-Hyde, J., (2007) Assessing the transmission of Commanders Intent. Presented at KSCO 2007. Waltham, MA.

### **Acknowledgement:**

Research was sponsored by the U.S. Army Research Laboratory and the U.K. Ministry of Defence and was accomplished under Agreement Number W911NF-06-3-0001. The views and conclusions contained in this document are those of the author(s) and should not be interpreted as representing the official policies, either expressed or implied, of the U.S. Army Research Laboratory, the U.S. Government, the U.K. Ministry of Defence or the U.K. Government. The U.S. and U.K. Governments are authorized to reproduce and distribute reprints for Government purposes notwithstanding any copyright notation hereon.