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An Enterprise Evaluation Methodology for Baselining the Australian Theatre Command

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ABSTRACT

The Australian Theatre (AST) exercises operational command for the planning and conduct of Defence operations, activities and campaigns. In 2001 the Chief of the Defence Force (CDF) and the Defence Science and Technology Organisation (DSTO) held a series of roundtable discussions. Amongst other things they identified Theatre evaluation as a key issue for supporting the development of AST. The recurring theme was the need to better understand current Theatre performance and to use the principles of 'Learning and Experimentation'[1] as the means for development. As a result, a team from DSTO[2] and Headquarters Australian Theatre (HQAST)[3] conducted a study into the feasibility of developing a methodology for evaluation and conducting a baseline measurement of the Theatre. This paper reports on the feasibility and initial development of the Enterprise Evaluation Methodology (EEM) which takes the approach of decomposing Australian war fighting principles into performance goals for the Operational Headquarters. Despite the resource intensive nature of the particular approach taken, the Theatre Baseline approach was judged ahead of current practice because it was based on values and principles rather than process.

1 Introduction

AST exercises operational command for the planning and conduct of Defence operations, activities and campaigns. Discussions between the Chief of the Defence Force and the Defence Science and Technology Organisation identified evaluation of AST as a key component to support the development of the Theatre. As a result, a team from DSTO and AST conducted a study into the feasibility of developing a methodology for evaluation and conducting a baseline measurement of the Theatre.

Developing and measuring a baseline is a fundamental activity to support planned development and change in the Theatre. A baseline establishes the current performance of the Theatre using both quantitative and qualitative measures. A baseline may also provide a comparative measure for understanding how the Theatre should be performing and highlights the gap between current and required performance. It may also be used to monitor the impact of planned and unplanned change.

In this paper we outline the aim and scope of the study in section 1, define AST, the subject of evaluation, in section 2, discuss the aim and scope of the study in section 3, outline the requirements of Theatre evaluation in section 4, compare evaluation methodologies in section 5, describe the Enterprise Evaluation Methodology in section 6 and its application in section 7, and, finally, present a brief discussion of the feasibility of the evaluation methodology in section 8.

2 Definition of AST: the Subject of Evaluation

AST is a complex modern military organization. AST was raised in 1997 to be the principal Joint Operational HQ, charged with the planning and the conduct of campaigns for the Defence

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[1] Senge, Peter, M. The Fifth Discipline, The Art and Practice of the Learning Organisation. (1992) Random House Australia

[2] Made up of staff from the Command and Control Division and the Defence Systems Analysis Division

[3] From the HQAST J8 Development Branch

of Australia and its interests, together with the development and refinement of campaign doctrine and processes [4].

AST is described as all the resources, capability and responsibilities[5] at the operational level delegated to COMAST by CDF. In 2003, prior to collocation, this encompasses three domains:

1. HQAST, which has overall responsibility for planning and conducting Joint operations and campaigns.
2. The Component Commands (Air, Land, Maritime and Special Forces), Northern Command (NORCOM) and joint support agencies such as the ADF Warfare Centre (ADFWC), Australian Joint Intelligence Centre (ASTJIC) and the First Joint Movement Group (1JMOVGP).
3. The Theatre of operations where the Theatre brings into effect its plans by creating Joint Task Forces (JTF), made up of force elements sufficiently prepared to perform their assigned tasks. The single services are responsible for raising, training and sustaining those elements so they can deliver the required level of preparedness. The joint assigned force outcome is the effect produced in the Theatre of operations as a result of the Theatre command processes and the actions of the force elements in the JTF.

3 Aim and Scope

The aim of the study was to test the feasibility of providing a tested evaluation methodology that would enable Theatre to develop a baseline of its performance[6]. The Theatre baseline would be a suite of measurements of the Theatre. The baseline would provide an initial measurement of the current state of the Theatre against which changes over time could be compared. The future collocation of Theatre HQ's in 2007 was highlighted as an event in the life of the Theatre that would benefit from having at least one pre-move and one post-move baseline conducted. In addition, once Theatre capability was known using standardized measures of performance, then the benefits of new war fighting concepts and future capability development could be determined by experimentation and reported using the same measures. The evaluation methodology employed for the baseline was also expected to provide a mechanism for monitoring the ability of the Theatre to function effectively.

4 Requirements for Theatre Evaluation

A number of criteria were identified[7] that defined the requirements for Theatre evaluation. These criteria were as follows:

- Provide information on how Theatre operates with respect to how it is expected to perform
- Provide insights into how Theatre might operate differently to more effectively achieve its goals.
- Be relevant to all activities and modes of Theatre operations.

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[4] Theatre overview, http://defweb.cbr.defence.gov.au/hqast/Overview.htm, last accessed 7 Mar 03.

[5] CDF Directive 2/97 of 30 Jan 97, describes the geographic responsibility of the **Theatre** as including: Australia, its territories and territorial seas; the Australian Fishing Zone (AFZ) and Exclusive Economic Zone (EEZ); the Australian Search and Rescue Region (SRR); regional countries involved in the Defence Cooperation Program (DCP) and their territorial seas; the standing operational areas; Australia's naval control and protection of shipping (NCAPS) area of responsibility; intervening international waters; and the airspace above all of these.

[6] This paper reports the outcomes of the initial phase of the activity

[7] Richer W, Hayter D. Theatre Evaluation Development Study (2000) HQAST Internal Report.

- Be relevant for different Theatre Tempo (at "rest" or involved in numerous activities and missions simultaneously).
- Be able to assess Theatre's capacity to plan, coordinate and conduct concurrent activities and campaigns
- Consider activity within the Theatre Headquarters and within the Theatre of Operations (assigned joint forces).
- Be compatible with both Single Service and Strategic level evaluation.
- Support development of the Theatre including immediate support to co-location of HQAST and long-term experimentation programs.
- Contribute toward the development of the Theatre's operational art.
- Have long-term relevance and be repeatable (longevity).
- Be easily understood and implemented by, ADF Theatre staff and incorporate data collection techniques that are simple to perform regularly and to a consistent standard.
- Not be Theatre resource intensive.

5 Comparison of Evaluation Methodologies

Faced with developing a suitable evaluation method for a system as complex and dynamic as AST, three types of models were examined:

1. Assigned force effectiveness;
2. Functional decomposition model;
3. Principal component model.

5.1 Assigned Force Effectiveness

The methodology of assigned force effectiveness based on operations research techniques, takes a "black box" approach to measuring system performance. The internal processes of sub systems are not evaluated directly. Performance is measured by comparing the output achieved with the inputs applied to the system. The advantages of the methodology are that it is simple and direct. However, it has the following limitations:

- For complex and evolving systems, measurements made at different times may be difficult to meaningfully compare, that is, it is not longitudinal.
- The environment of the system influences measurements, and this will reduce confidence in generalisations based only on linking outputs to applied inputs.
- The model does not provide any direct insights into mechanisms operating within the boundaries of the system.
- The model can only evaluate the system in operation, not at rest.

The assigned force effectiveness approach was judged useful for evaluating the operations of assigned joint forces, but less useful for the complex and evolving Headquarters component of Theatre.

5.2 Functional Breakdown Model

The Functional Breakdown model decomposes the system into functional elements. It assumes processes or tasks can represent the functions of the system. This model provides more insight

than the "black box" model into the internal operation of the system, by providing direct measurement of functional processes that collectively represent the system.

The use of the Australian Joint Essential Tasks (ASJETS) for evaluation is based on this approach. The functional breakdown model was used in conjunction with the 'black box' method during the exploratory observation of OP GUARDIAN II, the ADF contribution to the Commonwealth Heads of Government Meeting (CHOGM) in 2002. The functional breakdown model provided the opportunity for analysts to identify a small set of essential tasks based on the Op GUARDIAN II objectives The 'black box' approach assisted in developing within each essential task Measures of Merit (MoMs), based on Force Level Effects, for Theatre level processes. A separate paper[8] gives full details of this work.

The NATO Code of Best Practice is based on a functional breakdown model applied to military operations[9], which provides guidance to approaches in measurement of C2, Imagery Surveillance and Reporting (ISR) platforms, missions, considering human factors and capability development. The Code presents an MoMs hierarchical model widely used throughout the military community in the assessment of military and system effectiveness and performance. Measures of force effectiveness (MoFE) are derived top-down directly from mission goals and requirements. Measures of effectiveness (MoE) are a decomposition of MoFEs and assess the operational level military goals, with Measures of Performance (MoPs) derived from MOEs to support assessment of internal system level effectiveness. The results of evaluation are then rolled up the hierarchy to inform on the overall MoFE. Process decomposition into Task Lists, such as the United States (US) Universal Joint Task List UJTL[10], is the foundation of most task based military assessment systems with allies.

The advantages of the functional break down model are that it provides a direct measure of the system components and that it has more flexibility than the force effectiveness model in accounting for differences over time. The limitations are that it assumes that the overall system performance is an aggregate of functional performance. Improvements in a functional unit's performance will improve overall system performance. The model does not directly account for the interaction at functional interfaces, an important consideration in a complex organization such as AST. Moreover, while the model focuses on the tasks or processes of the organization, it does not take into account the values or principles that drive the organization.

5.3 Principal Component Model

The Principal Component model does take into account the values and principles that drive an organization. It is an approach to evaluation based on the values underpinning the functioning of the enterprise. This methodology relies on accumulating a comprehensive collection of elemental descriptive statements covering all aspects of the system. The principal components of the system can then be determined by aggregating the elements into groups that are as far as possible orthogonal (i.e. minimal cross influence between groups) to each other. It is these components that can then be evaluated.

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[8] Chisholm J & Richer W. Exploratory Observation of Operation GUARDIAN II (CHOGM 02), DSTO Technical Note in preparation.

[9] NATO Code of Best Practice (COBP) for C2 Assessment (RTO-TR-073 Revised 2002) and NATO COBP Analysis of Small Scale Contingencies (SAS-027).

[10] US UJTLS 3500.04B 1999 Version 4.

The advantages of the Principal Component model are that the process itself generates a deep level of understanding of the system. The selection of appropriate strategic goals leads to an evaluation method that goes beyond the process bias of the other two evaluation methodologies. The principal components that emerge from the process identify the principal factors that contribute to the performance of the system. Finally, there is a documented link back from the performance measures of the principal components to each of the large number of specific sub components.

The limitations are that the model relies heavily on the selection and understanding of appropriate goals of the system, and the selection of an appropriate method for generating a comprehensive set of elemental statements describing all aspects of the system. It requires substantial, and committed subject matter advisor involvement. It also requires intensive initial resource input to create the element database and to determine the principal components.

The Principal Component model was adopted for this study, evolving into what we have called the Enterprise Evaluation Methodology (EEM). In the next section we describe the EEM.

6 The Enterprise Evaluation Methodology

The EEM is an evaluation model designed to facilitate the extraction of the Theatre's current strategy into performance measures. The model seeks to identify activities that must be performed to a certain standard for the Theatre's strategy to succeed. In producing an evaluation of Theatre from a strategic focus the EEM ensures that developments of elements within the Theatre will not compete for resources, but allow allocation in a coordinated way. The EEM demonstrates how the many measures work together and their cause and effect relationship with the implementation of Theatre strategy.

Figure 1 illustrates the sequence of events involved in the EEM. Four phases will be discussed:

- The first phase translates an enterprise's strategy into an enterprise's goals fundamental to achieving that strategy.
- The second phase acknowledges the need to consider the many interrelated variables involved in the functioning of a complex enterprise system and employs an analytical enterprise model to translate the enterprise's goals into performance goals.
- The third phase identifies common evaluation measures that will provide data on more than one of the performance goals (to reduce the resources required to conduct the evaluation)
- The fourth phase of the EEM takes these evaluation elements for each performance goal and identifies metrics and means of measurement.

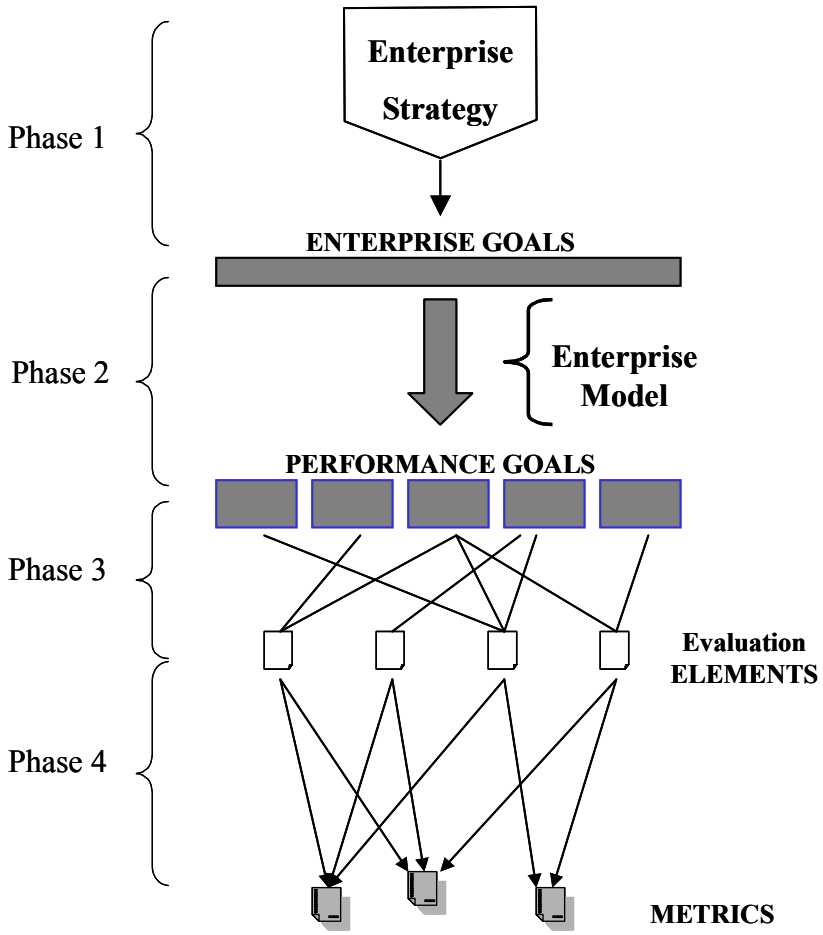

Figure 1:Enterprise Evaluation Methodology

Evaluation elements provide a long-term focus for Theatre Evaluation. For a new enterprise strategy, rather than the evaluation elements changing, it is the *link* between the evaluation element and the performance goals that would be expected to change. In the EEM model each evaluation element represents an activity of the enterprise, which is common for more than one performance goal.

7 Application of the Enterprise Evaluation Methodology

In the previous section, the meta-model for the methodology was described. In this section we describe the application of the methodology utilizing extant strategic war fighting guidance for AST and an enterprise model.

7.1 Phase 1: Strategy to Enterprise Goals

The first phase of the EEM requires the involvement of the enterprise's executive to select the appropriate strategy and then, in a facilitated workshop, unpack the strategic goals. The EEM seeks to identify a strategic goal for the business of war fighting. For this study the war fighting

strategy of Decisive Manoeuvre (DM) as described in document[11] was selected. DM, consists of five core warfighting concepts12 and four supporting concepts13 that underpin and enable the overarching concept of DM. These "Enablers" embody clear goals and provide a vision for the Theatre at the operational level, as it works towards the development of an Australian way of war fighting.

7.2 Phase 2: Enterprise Goals to Performance Goals

The EEM requires the use of an analytical enterprise model that best represents the enterprise and focuses on its strategic development initiatives. The enterprise model provides a framework within which a team of senior staff are able to review the defined enterprise goals and specify the attributes of the performance goals against the model.

The enterprise model chosen was the MIT90[14] model because of its familiarity to the ADF and Theatre staff and its application in related DSTO projects. The model provides a framework by which to consider each of the enablers in the areas deemed by the model to be necessary to ensure enterprise success. The MIT90 model proposes the following areas; technology, individuals and roles, structure, management processes, and strategy. The definition of the five areas in the MIT90 model are as follows:

- **Technology:** the Information Technology that can be applied to facilitate business processes.
- **Individuals and roles:** concerned with people within the organization, tasks they undertake, and the education and training they require to perform their functions.
- **Structure:** the way that the organization is partitioned and the way the partitions interrelate.
- **Management processes:** the standardized sequences of activities that organizations adopt in order to undertake the tasks they perform regularly.
- **Strategy:** general modes of doing business in pursuit of organizational goals[15].

The MIT90 model does directly account for the interaction at functional interfaces, unlike the functional breakdown models discussed previously.

Performance goals were defined in each of the areas for two representative DM Enablers. The Enablers selected for refined unpacking were a core and supporting concept, namely, "Coordinated, Precise Engagement "(CPE) and "Decision Superiority"(DS). These enablers were refined to produce the approximately 130 performance goals. The use of the enterprise model is illustrated in Figure 2.

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[11] Connolly, MG J.M, Decisive Manoeuvre (Jan 1998) http://defweb.cbr.defence.gov.au/hqast/j8/Items,%20References,%20Articles%20of%20General%20Interest%20to%20Staff.html, last accessed 7 Mar 03.

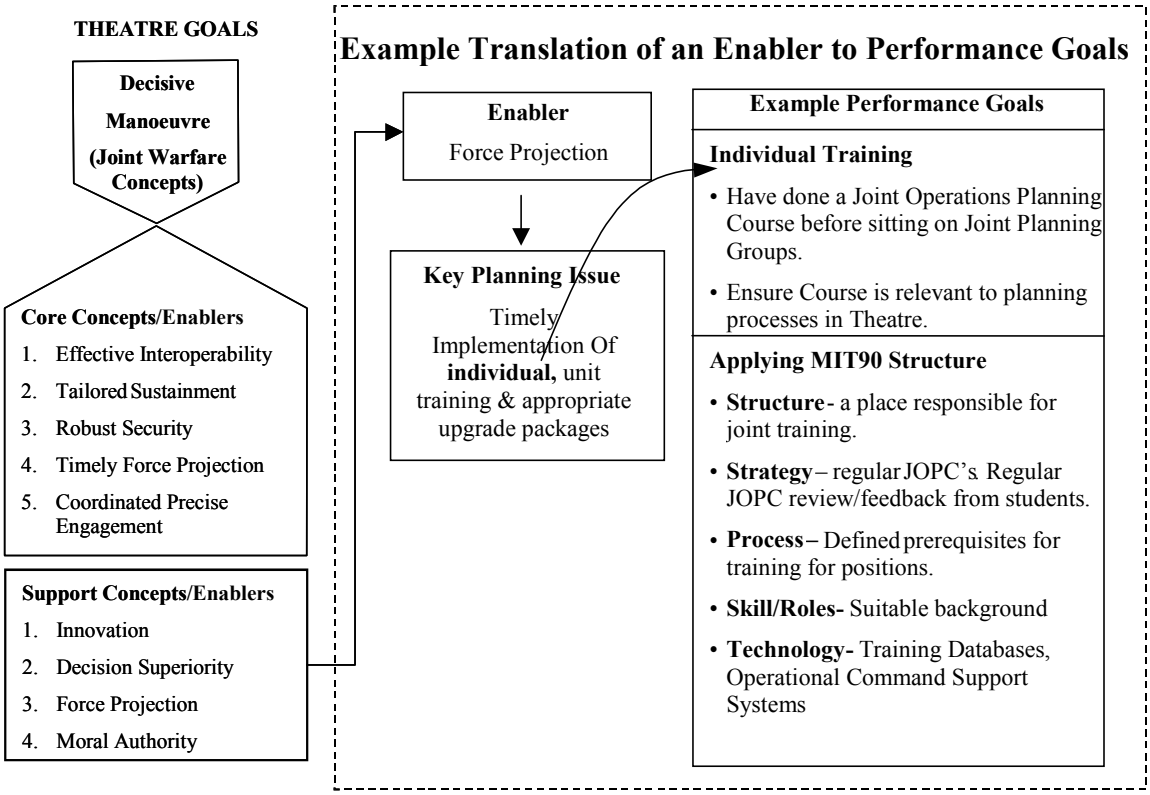
[12] Coordinated Precise Engagement, Timely Force Projection, Tailored Sustainment, Robust Security and Effective Interoperability.

[13] Decision Superiority, Innovation, Moral Authority and Force Preparation.

[14] Scott Morton, M. The Corporation of the 1990's: Information Technology and Organizational Transformation, (1991) Oxford University Press, New York

[15] Cook, Kasser and Burke, Assessing the C4ISR Architecture Framework for the Military Enterprise.

Figure 2: De-composing and translating Decisive Manoeuvre.



7.3 Phase 3: Performance Goals to Evaluation Elements

The performance goals determined in phase 2 represent critical enterprise attributes and these would ideally be the focus for developing metrics. However, ADF resource constraints require an aggregation of evaluation elements. While these constraints are addressed in this phase of the EEM they must also be considered in the development of metrics and means of measurement.

This phase requires the identification of the minimum number of evaluation elements relating to the maximum number of performance goals. Similarities and patterns between the attributes of Theatre performance, identified during phase 2, must be found so that multiple attributes can be addressed using one evaluation element.

It was not possible to develop the performance goals for the two Enablers as the latter were not sufficient to provide a comprehensive cover of all performance goals. Therefore, identifying a minimum number of evaluation elements that could infer a maximum number of performance goals was not possible at this stage.

7.4 Phase 4: Metrics

The final development phase of the EEM takes the evaluation elements (in the context of their corresponding performance goals) and seeks metrics that will provide data on more than one evaluation element. The result will be, where possible, the minimum number of metrics (or

actual measures that need to be taken and data collected) that inform on the maximum number of evaluation elements.

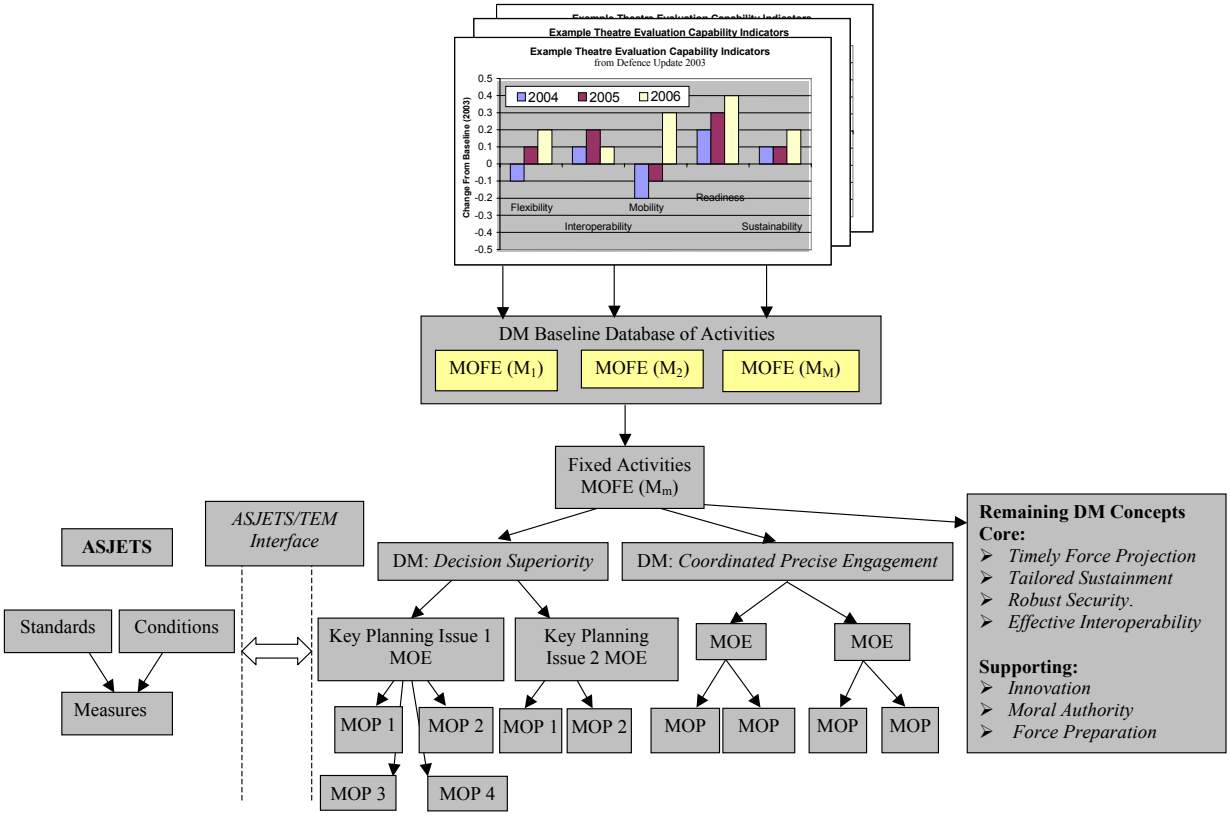


Figure 3:Metrics architecture for TEC.

Developing the metrics for the evaluation elements requires input again from the enterprise staff, this time at the working level. Staff with both specialist knowledge of available means of measurement and the activities to be evaluated, would help ensure the most appropriate means are proposed, tailored to the current situation and staffing.

Finally a tailored evaluation plan would be prepared which sets out clearly the metrics along with means of measurement and data collection, storage and reporting procedures. Most importantly, to enhance the enterprise's development, the plan would identify the relationship between the relevant performance goals and the current enterprise's strategy.

In the exemplar application, a metrics architecture was developed based on the NATO Measures of Merit (MoMs) hierarchy. This presents an overall metrics architecture which consists of Measures of Force Effectiveness (MoFE) at mission goal level, Measures of Effectiveness (MoE) supporting MoFEs at a lower level, Measures of performance (MoPs) at the system level, and conditions and standards as shown in Figure 3. However, the actual metrics were not developed at this stage because of time constraints.

8 Discussion: Feasibility of the Enterprise Evaluation Methodology

The adopted EEM has proved to be a feasible way to decompose AST Principles (as described in DM) into performance goals, for those sample enablers selected. The application exercise looked at the viability of applying the model for Theatre evaluation and started work on developing evaluation elements and thus a plausible evaluation instrument. While not all phases of the EEM were attempted in this initial stage of the project, it was partly confirmed that the EEM model would provide a means to develop an evaluation instrument for the Theatre, going from strategic objectives to performance measures.

Although the particular approach that had to be taken was resource intensive, the approach was judged to be ahead of current practice, in being values or principles based rather than process based. This study produced a methodology that, while not tested, could be used to provide a baseline. The next phase of the work will focus on further the development of the evaluation methodology in the context of a comprehensive Theatre evaluation capability.