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Decision Making”**

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EVIDENCE BASED DECISIONS & THE HOLY GRAIL - Dr Syd Morley

PPT1 – TITLE SLIDE

By way of introduction, I am based in the Ministry of Defence Head Office in London leading a small team of analysts and engineers. We provide advice on the technical and analytical integrity of business case submissions to the MoD's Director General of Finance in his capacity as Chairman of the MoD's Investment Approvals Committee - who in turn advises the Secretary of State for Defence. The business cases cover high value defence investment decisions principally embracing the Defence Equipment and Support organisation and the Defence Infrastructure Organisation in concert with the Front Line Commands. My particular area of responsibility lies in the cost effective acquisition of land equipment, defence infrastructure and support services.

It may be appropriate at the outset of today's conference to attempt to provide a top down view of the challenges and hurdles faced by decision makers. We must first ensure, however, that everyone from junior analyst to senior executive is aware of the fundamental steps in decision making through to the opportunities and threats offered by the exponential growth in computers and data storage capabilities in an increasingly networked world! Never before has it been more important to be able to distinguish the wood from the trees.

PPT2 – THREE LEGS OF DECISION MAKING

Whatever the decision, the underlying fundamentals are the same. When asked to explain the elements of decision making, one can draw upon the simple analogy based on the image of a three legged stool.

The legs of the stool are the three elements of any decision:

- what is the problem?
- what is known about the problem? drawing on existing evidence and lessons from previous experience

- what can be done to solve the problem? for example, in terms of alternative solutions or options

If any of the three legs is missing, there is quite simply no decision to be made. The decision maker must determine the logic by which the selection of the best solution can be achieved. It is the magnitude of the consequences of the decision to be made which drives determination of the resource necessary to arrive at a sound base of supporting evidence.

PPT3 – SPIDER DIAGRAM

A spider diagram provides a simple mechanism to identify the key steps necessary to arrive at a sound decision and indeed, to provide visual indication of progress made towards completion of each step. These are fundamental steps and to a seasoned decision maker can be looked upon as ‘teaching grandmother to suck eggs’! But not all decision makers are equal in terms of experience. We are quite often dealing with policy, planning and acquisition staff who are on a learning curve and so it is necessary to be able to articulate the essentials of the decision making process – hence, the spider diagram.

Starting with the first step at the top right hand of the circle and proceeding clockwise:

- is there a clearly articulated question and agreed by stakeholders?
- identification of stakeholders including those who will be impacted by the decision?
- what are the criteria by which a successful analysis outcome of the question is to be judged?
- range of solutions/options to be addressed in the analysis of the question?
- allocation of time and resource appropriate to magnitude of decision?
- identification of analysis tool(s) required to answer the question together with data and assumptions?

Construction of and discussion around such spider diagrams can assist the balancing of effort and resource to best achieve a successful decision outcome. In addition, we use traffic light systems to provide indication of the maturity of a business case decision by allocation of red, amber and green against key risk

areas embracing requirement specification through legal and commercial and on to delivery schedule, affordability, value for money aspects and so on.

PPT4: DECISION ORIENTATION – THE BIG PICTURE

There are two aspects of organising the problem that are important at the earliest stages of the decision making process. The first is whether and how the problem we are solving fits into the big picture and what aspects of that big picture are likely to have significant impact on our decision outcome?

PPT5: IDENTIFICATION OF CONSTITUENT PARTS WITH IMPACT ON DECISION OUTCOME

The second aspect is how we are to go about organising the approach to the solution of our problem. In the case of a multi billion pound investment decision, for example, we can break the problem up into its constituent parts enabling us to draw upon and focus the appropriate subject matter experts to individual aspects of the problem. We must not lose sight, though, of the role of the senior responsible owner of the problem. His or her responsibility is to maintain oversight of the totality of the approach to problem solution and, indeed, maintain an integrated and balanced approach to assembly of evidence into a digestible form suited to executive consumption at board level and, depending on the magnitude of the decisions to be made, to the Secretary of State.

PPT6: IDENTIFICATION OF STAKEHOLDERS

The definition of the problem at the outset of the decision making process is of paramount importance. Without the necessary understanding, we can spend nugatory effort tackling the wrong issues. This is why it is so important to identify key stakeholders in the decision at the outset so that relevant experience and expertise, including lessons from a historical perspective, can be drawn upon throughout the course of problem definition through analysis and data collection to generation of options and solutions - and finally to the down-selection of the solution that represents, for example, best value for money within defined affordability constraints.

PPT7: EFFECTIVE DECISION MAKING – AUSTERE BUDGET

Our aim, of course, is towards enhanced quality of decision making whilst enduring overall reductions to the defence budget. In these times of austerity, we must be seen to be doing the very best that can be done within a climate of diminishing resources – and it must be said a diminishing resource of experienced analysts – from which to deliver our commitment to cost effective investment of defence expenditure.

PPT8: TITANIC DECISION

Enabling the vision of true evidence-based decision making requires coordination of all those with responsibility for contribution to successful outcome. One may draw a rather simplistic analogy with an ocean liner. The chief engineer below decks requires suitably qualified personnel in terms of skills, expertise and experience to run the engines and the technology backbone of the ship. The captain on the bridge similarly requires suitably qualified staff to navigate the ship and provide a comfortable journey for his passengers across the Atlantic to its destination port in a safe and timely manner. Both captain and chief engineer must have the same understanding of the objective destination and both must be aware of their own individual responsibilities and operating constraints. Where we can fall down, however, on too frequent an occasion, is the emergence of tension between the captain and the chief engineer which can sometimes hinder the process of making a sound and safe decision. The captain may want the ship to proceed at full steam ahead, perhaps aiming for the kudos of a fast Atlantic crossing - but does not comprehend, for one reason or another, the warning advice by the chief engineer to proceed with caution at slow ahead to reduce the probability and consequent impact of a collision amid the icebergs.

I can think of too many projects – in my own experience of the world - where the announcement that a project is to be driven at pace has been accompanied by the subsequent downfall of the said project. Indeed, I am immediately cautious when I hear that a project is to be driven at pace with implication that sixes are to be rolled by the dice at every opportunity. Not that driving at pace is not a commendable objective – it is just that this statement has too often been accompanied by project delay – due to inadequate preparation and risk mitigation – or, even worse, project failure.

PPT9: DATA COLLECTION IS VITAL TO MAINTENANCE AND DEVELOPMENT OF CUTTING EDGE CAPABILITY

Collection and analysis of data on our defence equipment and operational environment is vital to sustainment and development of our armed forces such that they can remain at the cutting edge of capability. Analysis of data can provide new insights to the way in which our equipment can be operated more efficiently and effectively and, indeed provide direction for future development of operational strategy and tactics – and, of course, through to more cost effective acquisition of equipment, infrastructure and support services.

PPT10: COMPUTATIONAL MODELLING AND FORECASTING

We make extensive use of computational modelling tools to forecast the availability of equipment to enable rapid deployment when required and, of course, to forecast the training readiness of personnel such that they are able to embark fully prepared to operate in theatres around the world. The accuracy and, hence, utility of such forecasts demands expert and experienced appreciation of the type and scope of data collection required to enable the underlying predictive analysis to be undertaken. The maturity and utility of forecasting is tempered by known risks and uncertainties which must be balanced against the costs and the time delays associated with collecting and analysing more information to enhance the maturity of a decision.

PPT11: DATA COLLECTION = FOUNDATION FOR NEW DIRECTIONS IN RESEARCH AND DEVELOPMENT

Collecting and analysing large quantities of data plays a critical role in research and development assisting identification and generation of ideas and options for the future – whether they be ideas or options for new policies and plans through to options for new equipment, infrastructure and support solutions - and on to the triggering of fundamental research and development breakthroughs in the underlying technology base.

PPT12: LARGE SCALE DATA CONNECTIVITY, STORAGE AND COMPUTATION – OPPORTUNITIES AND CHALLENGES

Large scale computation and data storage solutions are increasingly more capable and affordable - and can be exploited to build data management and analysis systems with application to a range of challenging defence problems.

A perennial issue that has yet to be overcome, however, is the lack of usable historical data. Even where historical data exists, it is all too often rendered useless by the absence of the environmental context within which the data was collected.

PPT13: ELECTRONIC MONITORING AND DATA TORRENT – OPPORTUNITIES AND THREATS

So we must learn from the lessons of the past and better manage and capture the torrent of valuable data relating to our equipment and associated operational environments. However, it is a sobering measure of the sheer scale of the challenge that we face by examining the meteoric rise in data collection across the so-called digital universe over the last ten years illustrated in this slide where data storage is plotted in terms of zettabytes or billions of terabytes.

PPT14: OUTSOURCING

The MoD is becoming increasingly dependent on outsourcing of suppliers for maintenance, repair, overhaul, logistic supply and so on – and so it is absolutely essential that we become more astute in the capture of usage histories, equipment reliability records and so on. The consequence of not doing so would cost the public purse dearly through our inability to make accurate forecast of demand profiles through time.

PPT15: HUMS

The sustained efforts to promote the installation of electronic monitoring systems into our equipments, such as Health and Usage Monitoring Systems – or HUMS for short - and the associated storage of the collected data offers unprecedented opportunity to drive analysis and decision support. Successful exploitation of these increasingly expansive data volumes will very much depend on our ability to deeply embed the use of these monitoring and data collection systems into the information and workflows of the defence business.

PPT17: MYRIAD DATA SOURCE

The burgeoning growth of inexpensive sensors and instruments that can be embedded within all types of equipment - all communicating via web networks can be viewed as both an opportunity - but tempered by the need to manage exponentially expanding terrabytes upon terrabytes of data! This tends to suggest that we must pay even stricter and more rigorous attention to understanding the necessary and minimum data sets required to enable sufficient confidence in decision making. Sometimes less is more – as the saying goes – one must have sufficient understanding and experience to be able to distinguish the wood from the trees!

PPT18: PRESENTING RESULTS OF ANALYSIS TO EXECUTIVE DECISION MAKERS – BARE ESSENTIAL FACTS

It is worth taking a look at the all important aspect of presentation of the outcomes of analysis to support, for example, a business case for investment at executive board level. Comprehensive data collection and analysis will to be no avail if the outcome of analysis cannot be relayed to executive decision makers in a straightforward and digestible form. Experience tells us that the presenter should avoid, for example, delving into detailed technical information. Rather the presenter should present a concise summary overview typically in a few bullet points but be ready to answer detailed and probing questions by the board members. We must be able to demonstrate that the analysis has addressed the right question and has adhered to a well-defined process and best practice and quality control. Indeed, in the case of high profile defence equipment investment business case submissions to the MoD's Investment Approvals Board, an independent scrutiny report is prepared advising board members of the maturity

of key decision aspects across requirement specification, through affordability and value for money and on to commercial and legal issues.

PPT19: THE BALLOONIST AND THE ENGINEER

I will leave you with a light hearted analogy illustrating the importance of the relationship between executive decision maker and analyst – in this case an analyst with an engineering background. I apologise in advance to those of you who have heard it before – but the intention of the story is to highlight the importance of clarity and conciseness in communication of the outcomes of analysis up the chain to senior decision makers at board level. Insufficient attention to the manner of briefing key issues that drive decision making at executive level can seriously deplete the utility of analytical outcome with consequent misinterpretation and potentially unintended consequences.

A man in a hot air balloon ...