‘Fixed price’ versus ‘cost plus’ Defence contracting

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WHETHER major defence contracts should be awarded as ‘fixed price’ or ‘cost plus’ contracts remains controversial; sadly, both contracting models can result in unsatisfactory results, with unsuitable, non-viable, obsolete equipment often delivered late, and more than often at costs well above initial expectations. Of greater concern is that the debate over contract types obscures fundamental problems in most Western defence acquisition bureaucracies.

The Wedgetail AEW&C program ran into difficulties in a large part due to a breakdown in contractor risk management. While the program will result eventually in a viable capability, it is well behind the initial schedule, and will not deliver the full capability and performance specification initially contracted for.

Problems with the Collins submarine stemmed largely from inappropriate staffing of technical procurement positions with personnel not qualified in engineering and systems integration, but were later attributed to a variety of other causes. Through life support of the boats continues to present problems.

The Seasprite project has become synonymous with acquisition failure in Australia, yet it is one of a number of projects which by conventional engineering metrics quality as ‘failed’. The Seasprite project should never have been put to tender, given that the initial requirement for a compact shipboard helicopter had vanished.

In Australia, the long list of problematic or outright failed defence projects indicates that the rhetoric about ongoing reforms and continuous learning in the Defence Materiel Organisation (DMO) is not backed up with improved contracting outcomes. Too many defence contractors seem to exploit weaknesses in the DMO’s management model, and contracting practices exacerbate and perpetuate existing problems.

The recent strategy adopted by the DMO is to ‘lawyer up’ and put increasing emphasis on the legal side of contract negotiation, in parallel with a shift to procure MOTS (Military Off The Shelf) products, even though such equipment, designed for other nations’ operational needs and environmental conditions, may not suit ADF personnel in combat. This compounds an existing organisational failure by burdening the ADF with equipment that may be marginally useful in times of war, or in fact unusable.

While the problems may appear intractable to lay observers, they are not. Standard engineering and risk management practices used for decades work perfectly well in such situations, and it has been the policy of abandoning these proven and sound practices which has landed the DMO, and its peers in the United States and United Kingdom, in the predicament in which they now find themselves.

The grand experiment in ‘new age’ project management practices following service industry ‘business principles’ adopted since the end of the Cold War has been a failure, and should be abandoned. The corrective measures may not appeal to the DMO or to some contractors who have gained benefit from the current system, but defence procurement organisations and defence contractors need to provide the best possible equipment and services to warfighter.

‘Cost Plus’ contracting model

The widespread use of ‘cost plus’ defence contracts was developed primarily during the Cold War era, adopted to fund the rapid deployment of advanced military systems in the midst of a highly competitive large scale technological arms race between the West and its Soviet adversaries. In the Soviet command based economic system, every contract was a ‘cost plus’ contract since money did not matter. If more ballistic missiles, radar systems, submarines or fighter jets were required, Warsaw Pact citizens simply had to accept that supermarket queues for basic commodities would be longer. The whole Soviet economic model was centred on the commitment of all national resources to funding weapons of war. In the end this bankrupted the Soviets wholly and effectively lost them the Cold War.

The Soviets were a formidable and technologically competent peer competitor to the West, and matching or outperforming this potential enemy required huge advances in research and development, also the basic technology used to construct weapons. Technological advances during that period make contemporary military technological advancements appear lethargic if not stagnant.

Under these conditions, the use of ‘cost plus’ contracts, where costs were loosely negotiated but not binding, was often the only way to develop, build and deploy state-of-the-art capabilities quickly. Initially there tended to be quid-pro-quo caveats attached to these contracts, such as hard deadlines on deployment and unbreakable capability requirements on the product. If the product did not meet operational needs or ran too late, it was rapidly killed off and alternatives sought.

By the late 1980s, and earlier in the United States, the 'cost plus' contracting model became exploited. An increasing number of projects ran late, underperformed, and production examples proved so much more expensive than preceding generations of equipment – to the extent that production volumes collapsed or programs were cancelled.

Nevertheless, the 'cost plus' model had become defacto institutionalised in the United States, and there was more than often an expectation that all contracts should be managed in this fashion. That expectation persists in many Western nations.

There is clearly a case for the use of this type of contract under special circumstances, but only when it is clear that entirely new technology is being used and it is impractical to exactly predict how difficult it will be to develop and manufacture the equipment. There are almost no current major weapons systems programs in the West today that qualify as such, since nearly all involve the use of mature technologies or more than often, obsolete technologies.

Where inappropriate use of 'cost plus' contracts occurs today is when the procurement organisation cannot understand the basic technology involved in the product, and thus cannot perform a proper or competent assessment of whether a 'cost plus' or 'fixed price' contract should be employed. An unethical contractor under these conditions will have a great many opportunities to instill fear, uncertainty and doubt into the minds of the client, who once the contract is signed, is effectively giving the contractor a blank cheque.

This can be described as a risk assessment failure.

'Fixed Price' contracting model

The 'fixed price' model is the basis of most commercial contracting and indeed the foundation of the modern retail industry. It is widely enshrined in consumer protection legislation across most OECD nations. If a consumer buys a product the price is agreed, then paid, and the product is supplied. The supplier offers and agrees to a fixed price for the product, and an agreed rate for customer specified 'variations', which amount to changes to the product mandated by the customer after contract signature. A key caveat is that any 'variations' must be well understood by both parties before being agreed. Far too many acrimonious breakdowns in commercial contracts arise precisely due to misundertandings of the agreed terms for downstream 'variations'.

In the Defence contracting area, 'fixed price' contracts often fail for a variety of reasons. A common scenario is when the contractor or contractor team understates the risks inherent in the project, and then fails to meet capability, deadline or cost targets. More than often this is a result of the contractor(s) themselves not performing the necessary analytical 'due diligence' when bidding on the contract, and thus not understanding what might go wrong in the project and how much it will cost to fix. A related scenario is where the contractor does understand the risks and costs but intentionally understates them when bidding, in the knowledge that once the customer is committed they cannot easily back out, and thus will be forced to change to a 'cost plus' contract and pay for the contractor's shortfalls in order to get the product delivered.

More fundamentally, the problem that underpins most failures in both 'cost plus' and 'fixed price' contracts is the problem of managing risks.

Risk management

Risks are a reflection of uncertainties or a lack of prior knowledge, calculated by estimating the likelihood of an adverse event arising, then relating that likelihood to the consequences, or indeed the costs to be borne if the adverse event arises. The insurance industry makes a living out of compiling statistical data on the likelihood of adverse events arising, the costs to fix the problems, and sells insurance at premiums that allow them to make a profit. If a risk falls outside these boundaries, insurance will be declined.

In Defence contracting a range of risks may arise. The cost of materials, components or labour required to manufacture the product may change, and this may be unpredictable. Estimates of technical difficulty in meeting a technical performance target may be inaccurate or simply wrong. Scheduling and planning of production may be unrealistic. Unexpected defects or 'bugs' may be found in testing hardware, but especially in software development, and may take longer to correct than planned, incurring costs and delays.

Standard engineering project management practice is to identify where uncertainties may arise in any and all components of a project and model them in the project Work Breakdown Structure (WBS), schedule and cost structure models. The mid-1960s PERT (Project Evaluation and Review Technique) method, first used on the Polaris ballistic missile to meet a then considered unrealistic Initial Operational Capability (IOC) target, is for instance available now in almost every shrink-wrapped project management software tool. It is but one of a number of proven engineering project planning methodologies developed to allow effective management of uncertainties in projects.

If a risk is identified early, effort can then be focused on 'retiring' that risk as quickly as possible, so as to minimise uncertainties in the project's schedule, cost and performance targets. Competent project managers typically ferret out all risks as early as possible, and make provision for these in initial project estimations. In this way, a realistic and robust estimate of project schedule, cost and product performance can be set as early as possible, before a bid is even submitted.

The necessary prerequisite capability in performing risk estimations is an intimate understanding of the technology itself, and the development and production cycles involved. If these are well understood, extremely accurate estimates can be produced. Successful projects are invariably characterised by engineering and project managers who diligently 'pull the project apart' at the planning stage and isolate and analyse each and every risk involved. Failed projects are typically characterised by insufficient effort in the planning stage.

This practice is one which is often today expected only of the contractor, yet traditional engineering practice has always been that the contracting party does much the same work concurrently, and both parties compare notes before a contract is agreed. This ensures that a consensus is reached on exactly what risks exist and how they should be managed. Agreements can then be reached on exactly who pays for what proportion of the costs which may arise due to expected risks.

Most if not all of the failures observed today in major defence contracts arise because of failures of risk management, permitted to happen by the customer failing to perform a priori risk management tasks before and a posteriori risk management tasks after contracts are negotiated and signed. The root causes of these risk management failures lie invariably in a lack of technological competencies at the customer end, and a deeply held belief that understanding of the technology involved is not required to manage such programs.

The 'new age' project management belief system tend to attribute failures in practice and skills sets to effects such as 'emergent behaviour in chaotic systems'. The cynical view is that the 'new age' approach to project management is a byproduct of acquisition organisations funding research to justify their failures, rather than spending the funds on actually hiring qualified, experienced personnel. The sorry tale of the Collins, Echidna, Seasprite and Wedgetail projects are illustrative case studies of the failure of proper risk management processes, and the underlying problem of technological deskilling. The effort to recapitalise our fighter fleet is showing similar symptoms.

The current shift away from traditional engineering project management practices toward 'legalistic' practices will merely exacerbate existing problems further, as the traditional collaborative management of risk is replaced by an adversorial model of attributing blame. Whether the contract signed is a 'fixed price' or 'cost plus' then becomes irrelevant, since failure is guaranteed.

The Echidna EWSP upgrade was intended to address the needs of the F-111, all transports, and all helicopters, despite fundamentally different technical requirements upon the equipment. Attempts to later adapt the equipment to the F/A-18A HUG failed. A poor understanding of the frequently mutually contradicting needs in fast jet versus 'slow mover' EWSP systems, in terms of band coverage, response times, detection ranges, and threat densities resulted in a large 'omnibus' program guaranteed to get into difficulty.