Performance based contracting—a panacea for supporting legacy aerospace platforms?

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Introduction and aim

1. The Australian Defence Force (ADF) operates an aviation fleet of mixed age with an average aircraft age that has recently passed 21 years.[1] This ageing of 'legacy' aerospace platforms[2] within the fleet is driving an increase in supportability issues, particularly those concerning parts obsolescence and reliability degradation. The financial and human resources necessary to effectively address the increasingly problematic support issues are generally tightly constrained.

2. The impact of resource limitations is exacerbated by the often disparate nature of the support entity for legacy platforms. The typical 'entity' entails a Systems Program Office (SPO) managing a variety of small to large volume-based, process-oriented contracts. The nature of the contracts provides an inherent disincentive for contractors to improve platform supportability of their own accord as the quantum of their financial reward is often directly linked to the volume of repairs conducted.

3. The combination of ageing platform support demands, divergent goals within the support entity, and resource constraints thus generates an environment in which the quality of support outcomes generated for a legacy weapon system rapidly diminishes as that system enters the later stage of its life-cycle. This directly translates to a reduction in the level of military capability that can be generated with a weapon system as it ages.

4. Traditional Defence approaches towards the resulting capability issues are to either inject additional resources in order to improve support outcomes, or to accept a diminution in capability. In reality, the injection of resources for the support of a particular weapon system requires funding diversion from other activities with a likely decline in some other aspect of Defence capability. Thus, either way, the extant Defence approach towards managing the increasing support requirement of ageing legacy platforms necessitates compromising the overall level of achievable military capability.

5. An alternate approach is to adjust the nature of the contracted support arrangements. One particular concept that may offer a better solution in terms of capability obtained for resources invested is Performance Based Contracting (PBC). While consideration of PBC is now mandated for the sustainment of all new aerospace platforms, serious organisational consideration has not yet been given to extending application of the concept to support legacy platforms.

6. The aim of this paper is to examine the adoption of PBC concepts for legacy platforms as a cost-effective means of enhancing ADF aerospace capability.

7. The paper provides a description of PBC and the nature of the ADF aerospace support environment. Legacy ADF aerospace system characteristics are then explained along with the key generic characteristics of current support contracts. The paper goes on to examine the potential for incorporating PBC concepts within existing support arrangements for legacy aerospace weapons systems.

BACKGROUND

8. To appreciate the possibilities of PBC with regard to its potential application for the support of legacy ADF aerospace platforms, it is useful to first outline where and how it originated, the distinguishing features of the concept, and how it has been applied to date within Australia.

Genesis of Performance Based Contracting

9. PBC, as a support philosophy for weapon systems, originated in the United States.[3] Following the end of the Cold War in 1989, the US military slowed the rate of weapon system replacement that it had previously viewed as necessary to maintain a technological combat edge over the Soviet Union. As a consequence, the average age of the US military aviation fleet gradually increased with an attendant rise in age-related supportability requirements. At the same time, the level of priority accorded by the US to military expenditure declined.[4]

10. From an industry perspective, the US Department of Defense (DoD) contracted extensively via predominantly short-term process-oriented contracts for the provision of parts and/or repair actions.[5] As profit was determined by the volume of outputs, contractors were interested in the number of repairs while, from a reliability management perspective, Defense was interested in the quality of repairs. Consequently, divergent goals developed between Defense and industry.

11. The combination of fiscal constraints, divergent support goals, and increasing supportability requirements resulted in sub-optimal support outcomes for the US military. Against this backdrop, PBC rose to prominence as a concept in the late 1990s[6] with the intent of converging the focus of constituent support elements onto the common objective of improving the cost-effectiveness and quality of logistics support for military platforms.

12. Within the Australian Department of Defence (Defence), PBC was given prominence as one of several procurement reforms that accompanied the establishment of the Defence Materiel Organisation (DMO) in 2000. For the support of aerospace platforms, PBC was given stronger impetus with the release of the Australian Defence Aerospace Sector Strategic Plan (ADASSP) in 2003 which re-emphasised the active pursuit of 'an outcomes-based approach to contracting'.[7]

Concept

13. The aspect of PBC that enables the objective of improved support to be achieved is that it changes the contractual focus from outputs to outcomes. More specifically, PBC entails buying performance, or outcomes, that are pertinent to the end user's (war-fighter's) requirements rather than the traditional approach of buying outputs such as individual parts or repair actions.[8] Underpinning PBC are three key inter-related features: outcomes, metrics and payment regime.

14. **Outcomes.** PBC is most effective when contracting for outcomes that are directly linked to the war-fighter's requirements.[9] This is generally only possible with contracts that encompass substantial support responsibilities thus empowering the contractor the ability to directly manage many of the factors influencing the outcomes. Table A identifies high-level outcomes currently mandated for inclusion in Defence PBC contracts that aerospace platforms.[10]

15. **Metrics**. The selection of contract performance measurement metrics that are related to the specified outcomes is critical.[11] As with outcomes, metrics should be at the highest-level commensurate with the scope of contracted responsibility.[12] Emphasis is placed on keeping the metrics simple, meaningful and easily measurable in order to avoid disputes and to simplify administrative efforts. Metrics that complement outcomes are also identified in Table A.

Outcome	Performance Metric
Systems Readiness	Available Aircraft
Mission Success	Mission Reliability (Mean Time Between Critical Failure)
Assurance of Supply	Demand Satisfaction Rate

Table A: ASD nominated PBC Outcomes and Performance Metrics[13]

16. **Payment regime.** PBL payment regimes are structured to incentivise achievement of desired outcomes.[14] Ideally the contract price is a fixed price per 'unit of utilisation' of the weapon system rather than the traditional price per 'unit of repair'.[15] Figure 1 illustrates the Australian concept of how performance against particular metrics influences the price actually paid under a PBC arrangement. Key aspects are that the 'at risk' element of total contract price is large enough to focus contractor interest; that the metrics are few in number such that poor performance against any one metric will have a noticeable financial effect; and that the relationship between performance and reward need not be linear over the entire performance range.[16]

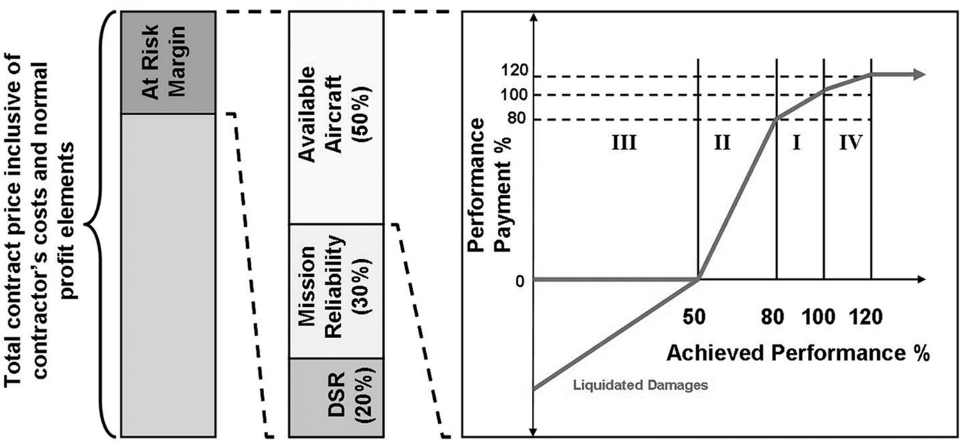

Figure 1: ASD PBC payment regime

17. Substantial performance improvements and cost reductions have been attributed to PBL arrangements implemented in support of the US military. Across a number of selected contracts, item availability is reported to have increased by an average of 30 to 40 per cent over earlier non-PBL support arrangements while total operating cost has also typically been reduced.[17] PBL-related savings of up to $15 billion are purported to have been achieved across the US DoD.[18]

18. Within Australia, PBC implementation has thus far focused on new weapons systems through integrated acquisition and sustainment contracts. Notably, the few PBC sustainment contracts are all

total-logistics-support contracts at the whole-of-weapon-system level and are generally intended to be in place for the life of the weapon system.[19] Systems that are, or will soon be, supported by PBC arrangements include the Hawk lead-in-fighter, the Tiger Armed Reconnaissance Helicopter and the Multi-Role Tanker Transport.[20]

19. Conceptually, PBC is highly effective in its ability to focus contractors on achieving performance objectives that are valued by war-fighters. The keys to the success of PBC are the specification of outcomes associated with war-fighter requirements, the assignment of performance metrics to those outcomes, and an incentive-based payment regime that is linked to those metrics in order to reinforce the desired outcomes.

ADF aerospace support environment

20. The nature of the current ADF aerospace support environment provides both opportunities and challenges for the implementation of PBC in support of legacy platforms. To understand the current environment, it is necessary to look back to the early 1990s.

21. Up until the early 1990s, the ADF possessed significant organic capabilities for the acquisition and sustainment of aerospace weapons systems. 'Ownership' of support resources largely ensured that constituent support elements were aligned to common objectives while also providing the ADF with inherent flexibility in adjusting those elements to satisfy changing support requirements. However, while effective, the cost of this arrangement was excessive[21] and was to prompt what became a series of paradigm shifts in support arrangements.

22. The first move came in the mid 1990s with the transfer of acquisition responsibility to the Defence Acquisition Organisation (DAO) and sustainment responsibility to Support Command Australia. The second move, implemented via the Defence Reform Program (DRP), came on the back of recommendations of the 1987 Defence Efficiency Review (DER). This move entailed the integration of acquisition and support responsibilities within the DMO and the commencement of wide-scale outsourcing of many deeper maintenance (DM) and through-life-support logistics management activities.[22] The third and most recent move came with the release of the ADASSP in 2003. The ADASSP recommended a substantial rationalisation of the defence aerospace industry in conjunction with the establishment of longer-term, typically life-of-type, contracts as a means of sustaining key industry capabilities necessary to support the ADF.[23]

23. Of relevance is the resulting variety of contracts that are now in place to support ADF aerospace platforms. Remaining pre-DRP contracts are typically very narrow in scope, strongly process-oriented, and contain little if any responsibility for through-life-support (TLS).[24] Most contracts established in the aftermath of DRP to support existing aerospace platforms, while still process oriented, are generally wider in scope and have more extensive responsibility for TLS.[25] Meanwhile, recent acquisitions of new aerospace platforms have adopted the approach now articulated in the ADASSP. That is, these systems have been procured via integrated acquisition and long-term sustainment contracts that entail comprehensive PBC arrangements from the outset.[26]

LEGACY AEROSPACE PLATFORMS IN THE AUSTRALIAN CONTEXT

24. As defined for the purpose of this paper, a 'legacy aerospace platform' is any aerospace platform that has not been acquired via performance-based acquisition and sustainment contracts. This section briefly outlines the extent of legacy platforms within the ADF aviation fleet, explains pertinent legacy supportability characteristics, and highlights issues with extant legacy support contracts.

Type	**Fleet age**
C130-J Hercules Transport	5 years
Blackhawk S70A-9 Helicopter	15 years
F/A-18 Hornet Fighter	18 years
AP3-C Orion Maritime Patrol	24 years
C130-H Hercules Transport	26 years
Sea King SK50 Helicopter	27 years
F-111 Strike	33 years
Iroquois Helicopter	35 years
DH4-C Caribou Transport	40 years

Table B: Age of selected legacy platforms—ADF aviation fleet[27]

Legacy platforms

25. As only a handful of platform types have been acquired via PBC arrangements, most ADF aviation assets qualify as 'legacy platforms'.

26. From the statistics provided on selected legacy platforms in Table B above, most may also be regarded as 'aged aircraft'.[28] The current ADF aviation fleet of 420+ aircraft has an average age of approximately 20 years.[29] This is reflective of the current ADF trend of operating aircraft over increasingly extended lives of 20 to 30 years or more, due in part to the significant cost of acquiring new platforms.

Legacy characteristics—bathtubs, slippery dips and associated issues

27. Pertinent to an understanding of legacy system supportability issues is an appreciation of 'aged aircraft' characteristics. These may be readily explained in terms of 'bathtubs' and 'slippery dips'.

28. The reliability 'bathtub' curve is representative of the reliability behaviour of an aircraft over its life cycle. As illustrated in Figure 2, the curve features an initial 'wear-in' phase, a steady plateau of random failures, and a late life-cycle exponential rise associated with 'wear-out' due to a combination of age and usage related factors.[30]

29. Coincident with failure rate, the bathtub curve also provides a good approximation of the cost of support over time. In addition to reliability degradation, age-related technology obsolescence is another significant cost driver.[31] Electronics obsolescence is of particular concern with support lives for many avionics systems now heading below three years.[32] Consequently, it is not just the older legacy platforms such as the F-111 and C130-H that exhibit age related supportability issues. Relatively new avionics systems within the C130-J fleet[33] and the recently upgraded AP3-C fleet[34] are also presenting notable obsolescence challenges.

30. The 'slippery dip' curve, also illustrated in Figure 2, depicts the capability edge that a military platform typically provides over a potential adversary and how it declines over time if the platform design is not modified. This results in a condition described as the 'capability slippery dip'.[35]

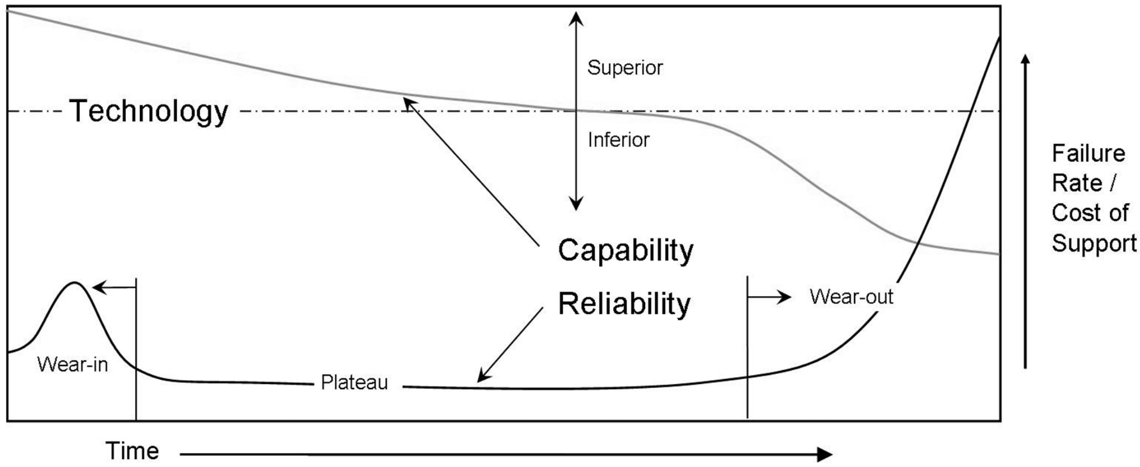

Figure 2: Typical reliability 'bathtub' curve and capability 'slippery dip'

31. The useful lives of a platform may be extended via design intervention to incorporate new technology with the objective of either boosting the relative capability edge and/or improving reliability and/or addressing obsolescence.[36] The potential impact of a design intervention on capability, reliability and support costs is shown in Figure 3.

Legacy contracts—drowning in dysfunctional process

32. As previously detailed, a variety of contracted support arrangements are in place for legacy platforms.[37] However, most legacy contracts possess the same basic characteristics. The current Avionics Business Unit (AVBU) contract,[38] used here as a case study, typifies four characteristics of primary interest: lack of a direct linkage to war-fighter requirements, a focus on outputs rather than outcomes, process related metrics, and volume related payment regimes.

33. **'War-fighter' requirements.** The AVBU contract contains a detailed, highly prescriptive Statement of Requirement (SOR) that identifies estimated work volumes based on historic logistics activity levels. Notably, those activity levels relate to the late 1990s 'peacetime' flying program which *does not* correlate either with the likely contingency Rate of Effort (ROE) or the extant flying program.

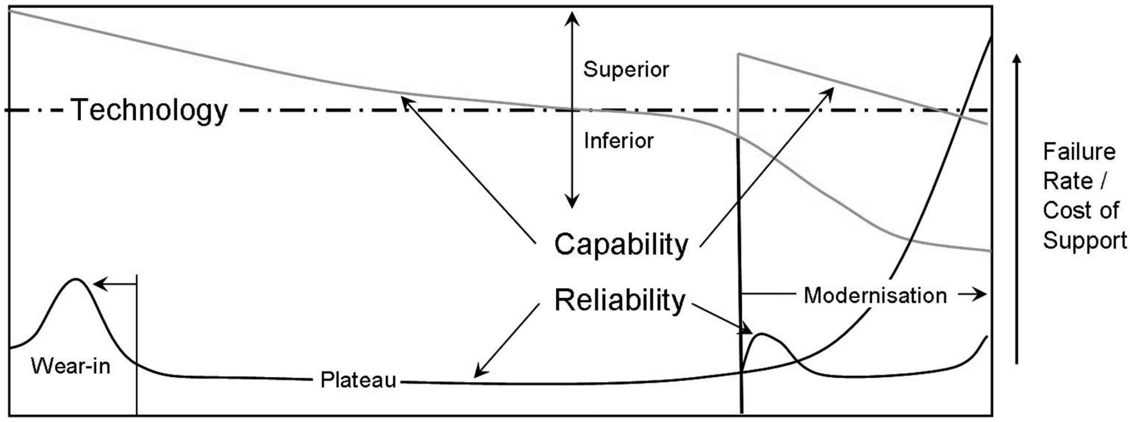

Figure 3: Impact of technology insertion on capability and reliability

34. **Outputs versus outcomes.** The prescriptive nature of the AVBU SOR was useful for ensuring that prospective tenderers clearly understood the requirement during the tendering process. However, it has also placed an inordinate focus upon processes and outputs at the expense of outcomes.

35. **Metrics.** Performance measurement metrics within the AVBU contract are largely centred on process turn-around-times. This drives the contractor to focus on outputs rather than quality of the process.

36. **Payment regime.** The AVBU contract payment regime is essentially 'fixed price' per unit of output. The volume-based reward regime provides an inherent disincentive for the contractor to improve weapon system reliability (and hence reduce the number of repairs) through self-funded technology insertion or improvement in the quality of repairs. Hence the contractor's objectives, driven by the pursuit of profit, are typically divergent from those of the Commonwealth.

37. The identified legacy contract characteristics pose limited issues for a platform within the plateau zone of its life cycle. However, most legacy platforms are well within the wear-out zone. At a time when a dynamic response is necessary to manage an exponential degradation in reliability and increase in obsolescence, both the Commonwealth and contractor typically bog down in the administration of numerous process-related contract change proposals (CCPs).[39]

38. From a Commonwealth perspective, the impact is exacerbated by personnel caps that make it difficult to alleviate the administrative workload. In practice, most SPOs find it easier to accept excessive support costs than expend the bureaucratic effort in process interfaces[40] and contract changes necessary to pursue reliability related improvements.[41]

39. In an environment where financial resources necessary for funding contract changes are also constrained, the inevitable result is an increasing disparity between the outputs of various contractors and the supportability outcomes required by 'war-fighters'. This directly translates to a degradation in aerospace capability.

40. Most ADF legacy platforms are considered to be 'aged aircraft' with a number firmly within the wear-out zone of their life-cycle. The support construct for all platforms includes some degree of contracted support. While the scope of contracts varies markedly, they generally share some common characteristics. These include a lack of direct linkage to war-fighter requirements, a strong process orientation, process related performance metrics and a volume-based payment regime that inherently

discourages reliability improvement efforts on the part of the contractor. The identified characteristics generally foster divergent contactor and Commonwealth goals and constrain the Commonwealth's ability to effectively deal with the many supportability challenges of legacy aircraft.

CONSIDERATIONS FOR APPLICATION OF PBC TO LEGACY SYSTEMS

41. Conceptually, PBC as recently adopted for the support of new ADF aerospace platforms appears to offer an attractive alternate to the current process-oriented support contracts that are in place for many of the ADF's legacy platforms. However there are some notable difference between the supportability characteristics of new and 'aged' platforms—most legacy platforms also being aged platforms. Consequently, there are several key areas that require careful consideration if PBC is to be successfully adopted for legacy support. The areas that are examined within this section include industry factors, timeframe and the three key PBC features of outcomes, metrics and payment regimes.

Industry factors

42. At first glance, industry factors appear to limit the attractiveness of seeking to incorporate PBC concepts within legacy platform support contracts. Many of the current contracts are effectively for the life-of-type of the supported platform. Consequently the utilisation of PBC for the support of legacy platforms will, in many instances, require negotiated contract changes. This places industry in a potentially more advantageous negotiation position than would be the case with a competitive re-tender.

43. However any desire to exploit this advantage is tempered by the long-term view encouraged by both the ADSSP and DMO's *Company ScoreCard*, and adopted by most contractors supporting legacy aerospace platforms.[42] The *Company ScoreCard* is utilised by the DMO as a performance measurement tool for contractors engaged in acquisition or sustainment contracts. A company's past performance, as captured by the tool, is given considerable weight during tender evaluations and source selections for new contracts.[43]

Timeframe

44. For each legacy platform, the time remaining until its retirement from service influences the feasibility of adopting a PBC support arrangement. Two key factors are the time necessary to incorporate PBC features into an extant contract and the residual period left within which both Defence and industry can benefit. US experience indicates that the time period required to establish a new PBC contract is typically two years. The incorporation of PBC features into an extant contract would presumably require a shorter period, however anything less than 12 months is probably optimistic.[44]

45. From an industry perspective, one of the attractive features of PBC is the prospect of reliability-based profits. Put simply, when contracting for a fixed price per unit of output, it becomes attractive to invest in the exploration and implementation of reliability improvements and obsolescence solutions if the subsequent savings in repair costs borne by the contractor return a sufficient net profit. Thus the length of a PBC contract can significantly influence the potential quantum of reliability-based profits that a contractor may hope to achieve.[45] This aspect may reduce the attractiveness to industry of incorporating PBC into extant legacy contracts for the F-111 (PWD of 2010) whereas this may not be a limitation for legacy contracts supporting the AP-3C (PWD of 2015) or the C-130H (PWD of 2020).[46]

Outcomes

46. PBC contracts implemented within Australia to-date in support of aerospace platforms have entailed comprehensive responsibility for most through-life-support aspects of the respective platforms. As Table C illustrates, this scope of contracted responsibility has readily enabled the specification of required contractual outcomes that are measured at the platform-level as the contractor has the wherewithal to control many of the factors that influence those outcomes.

Outcome	Performance Metric	Means of measurement
Systems Readiness	Available Aircraft	Single target measured at platform level
Mission Success	Mission Reliability (MTBCF)	Aggregate platform MTBCF
Assurance of Supply	Demand Satisfaction Rate (DSR)	Aggregate measure of all platform RIs and BDS

Table C: Platform level Outcomes and Performance Metrics

47. Few contracts supporting legacy platforms approach this scope of responsibility. Most are limited to a sub-set of systems/components within the platform and have varying degrees of responsibility for through-life-support management. Consequently, contractors supporting legacy platforms do not generally have sufficient influence over the variety of factors that permit contracting for platform-level outcomes. Notwithstanding this, the same types of outcomes can be specified, albeit with measurement at a lower-level that is commensurate with the scope of contracted responsibility. Appropriate sub-platform level outcomes and metrics are suggested in Table D.

Outcome	Performance Metric	Means of measurement
Sub-systems Readiness	Available Repairable Items	Discrete target for each RI within scope of contract
Mission Success	Mission Reliability (MTBCF)	Aggregate MTBCF of all RIs within scope of contract
Assurance of Supply	Demand Satisfaction Rate (DSR)	Aggregate measure of all RIs and BDS within scope of contract

Table D: Sub-platform level Outcomes and Performance Metrics

Metrics

48. From Table D and the preceding discussion, it is clear that some adaptation will be required of the standard ASD platform-level performance metrics to make them suitable for the sub-platform scope of most legacy contracts.

49. Least affected are the metrics of Mean Time Between Critical Failure (MTBCF) and Demand Satisfaction Rate (DSR). This is due to both metrics, at the platform level, being measured respectively by the NetMAARS and SDSS logistics information systems as aggregate values of component reliability and individual demand success/failure rate. The development of appropriate data queries would enable these systems to generate reports that consider only those components/demands relevant to the scope of a sub-platform legacy contract.

50. More problematic is the metric for measuring Readiness. At the platform level, the metric entails a single measure of the number of platforms available for use by the war-fighter at nominated times. The determination of what constitutes an appropriate performance target is also relatively simple as the required number of platforms can usually be readily derived from the preparedness guidance applicable to the weapon system. At the sub-platform level, performance targets must be established, and the metric measured, at the individual component level. For legacy contracts encompassing numerous component types,[47] the calculation of the combination of type and quantity of RIs required to be available for operational maintenance to assure a given level of platform availability is a complex undertaking.[48] In addition, the combination required is usually sensitive to changes in preparedness requirements, platform maintenance policy, and the reliability of platform components. Hence availability metrics specified at a sub-platform level are considerably more dynamic than when specified at a platform level. Consequently, for availability to be a useful PBC metric for sub-platform legacy contracts, considerable administrative effort will be required to ensure that specified performance levels continue to accurately reflect the war-fighter's platform readiness requirement.

Payment regime

51. The standard ASD PBC payment regime, as illustrated earlier at Figure 1, is simple in its application and powerful in its effect when applied to platform-level contracts. The power of the model lies in the substantial influence upon payment that can be generated by poor performance against any one metric. If adopted unchanged for sub-platform legacy contracts, similar power is retained for the MTBCF and DSR metrics. However the power of the Availability metric is diluted in direct proportion to the number of discrete RIs encompassed within the performance measure. More specifically, poor availability of any one Repairable Item can potentially ground an entire fleet, yet have negligible effect on payment due under the contract.[49]

52. Consequently, additional features may need to be incorporated within the payment regime to ensure attention is focused on problem RIs that may be significantly affecting availability at the platform level. Possible approaches include increasing both the at-risk proportion of contract price and the weighting assigned to the availability metric, and assigning a 'penalty rate' for the metric that is higher than that typically assigned for platform.

53. There are some notable differences between the support environment and requirements of new and legacy aerospace platforms. The key differences are timeframe and the scope of contracted responsibility. The limited service life remaining for a number of legacy platforms will restrict potential PBC gains as insufficient time remains to obtain any significant return on investment. In

addition, the sub-platform scope of most legacy support contracts will require some adaptation of the platform level outcomes, metrics and payment regimes that have been adopted thus far within PBC contracts for new platforms. Adaptations that may be necessary have been identified and, for the most part, should be relatively easy to implement.

Conclusion

54. The ADF operates an aviation fleet of mixed age. The older aerospace platforms within the fleet are firmly into the 'wear-out' phase of their life cycles which generates an attendant increase in support requirements—most notably to address exponentially increasing rates of parts obsolescence and reliability degradation. These platforms are typically supported by highly-detailed, process-oriented contracts that foster divergent Defence and industry objectives. In addition, as supportability requirements increase, so too does the level of contract administrative effort and funding necessary to incorporate changes at the detail level of the contract.

55. Conversely, the support philosophy now adopted for new aerospace platforms entails contracting directly for outcomes that are valued by the war-fighter via PBC. As contract profit is tied to performance in achieving outcomes rather than outputs, PBC effectively brings together the objectives of Defence and industry. Indeed, industry is motivated by the prospect of additional 'reliability-based profits' to invest in continually improving performance outcomes. In addition, by contracting for outcomes, PBC facilities a move away from detailed, prescriptive contracts which significantly eases contract administration workload.

56. It follows that, at least at a conceptual level, PBC appears to offer an attractive alternate support philosophy to the process-oriented contracts currently in place for many of the ADF's legacy aerospace platforms. This is particularly so against the backdrop of purported PBC successes within the US DoD.

57. However, the application of PBC for the support of legacy aviation weapons system will require consideration on a contract-by-contract basis. Maximum benefit from PBC adoption occurs when industry proactively seeks to improve, or in the case of legacy systems, maintain system performance by addressing parts obsolescence and addressing reliability issues. Consequently, the period of in-service life remaining for a platform will have a significant impact upon the return-on-investment period available to industry and hence their level of interest in PBC for a particular legacy platform.

58. The key PBC contract features will require varying levels of adaptation. This is driven more by the sub-platform level of most legacy support contracts rather than characteristics of the legacy platforms themselves. However, the necessary adaptations are conceptually minor and should not undermine the basic effectiveness of the PBC model.

59. Consequently, apart from the caveat of available time for some platforms, PBC does appear to offer an effective support solution for legacy aerospace platforms. The key benefit is the much greater motivation and freedom of industry to pursue innovative management of parts obsolescence and reliability degradation—these being significant supportability challenges that usually severely compromise the level of attainable capability during the latter stages of a platform's life cycle.

Recommendations

60. With the prospect of obtaining a better aerospace capability outcome for the level of resources invested, it is recommended that:

a. contracts supporting legacy platforms be reviewed to determine individual suitability for incorporation of PBC features,

b. legacy support contracts suitable for incorporation of PBC features be prioritised according to greatest potential capability gain/preservation associated with addressing extant platform supportability challenges,

c. DMO negotiate with relevant contractors to incorporate PBC features into selected extant support contracts for legacy aerospace platforms, and

d. DMO adapt extant PBC implementation guidelines for platform-level contracts to accommodate adaptations necessary to implement PBC contracts at a sub-platform level.

Authorities consulted:

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WGCDR K. Millar, Commanding Officer, Strike Reconnaissance Logistics Management Unit

WGCDR M. Scougall, former Chief Engineer, Strike Reconnaissance Systems Program Office

Endnotes

1. The increasing age of the fleet reflects the current Defence trend of retaining aircraft as long as is possible before committing to the considerable cost of acquiring replacement platforms. Average age statistic obtained from C.K. Crowley (WGCDR), 2005, 'Balls to juggle, bathtubs to plot & journeys to finish', presentation prepared for RAAF School of Technical Training, in possession of the author, RAAF Wagga.
2. For the purpose of this paper, the term 'legacy aerospace platforms' refers to all ADF aerospace platforms other than those recently acquired and supported via performance-based contracts.
3. PBC is a term currently applied within the DMO while the US DoD uses the term 'Performance Based Logistics' (PBL) to describe essentially the same concept. For simplicity, the term PBC is used within this paper when referring to performance-based contracting in either country.
4. C.K. Crowley (WGCDR) & R. Heslehurst, 'A management philosophy for long life-cycle ADF aircraft: maintaining safety, effectiveness and economy from "lust to dust"', paper presented to the 10th Australian International Aerospace Congress, Brisbane, 29 July–1 August 2003, p. 2.
5. Department of Defense (USA), *Performance Based Logistics: A Program Manager's Product Support Guide*, Washington, 2004, p. 11.
6. The US Department of Defense (DoD) mandated in 2001 that PBL be considered for the support of all new weapon systems. See H.J. Devries, 'Performance-Based Logistics—Barriers and Enablers to Effective Implementation', *Defense Acquisition Review Journal*, December 2004–March 2005, Defense Acquisition University, California, p. 244.
7. Department of Defence, *The Australian Defence Aerospace Sector Strategic Plan*, Defence Materiel Organisation, Canberra, 2003, pp. 16, 79.
8. Statement by Mr Lou Kratz, Assistant Deputy Undersecretary of Defense (Logistics, Plans and Programs) as quoted in Aerospace Industries Association, 'Performance-based Logistics: Buying the Product Support Outcomes', *Aerospace Industries Association Newsletter*, Vol. 9, No. 5. February 2005, viewed on 20 August 2005, <http: //www.aia-aerospace.org/aianews/newsletters/2005/feb05news.cfm>.
9. D. Berkowitz et al., 'Defining and Implementing Performance-Based Logistics in Government', *Defence Acquisition Review Journal*, December 2001–March 2005, Defence Acquisition University, California, p. 263.
10. Department of Defence, *Aerospace Systems Division Performance Based Contracting Handbook*, Defence Materiel Organisation, Canberra, 2005, p. 2–1.
11. H.J. Devries, loc. cit.
12. Department of Defense (USA), *Performance Based Logistics*, p. 28.
13. Department of Defence, *Aerospace Systems Division Performance Based Contracting Handbook*, 2005, p. 3–3.
14. Aerospace Industries Association, 'Performance-based Logistics: Buying the Product Support Outcomes', ibid.
15. An example is 'power by the hour' contracts where the customer pays a set price for a given level of utilisation regardless of the number of repair actions required.
16. Diagram sourced from S. Sheedy (GPCAPT) et al., 'Performance Based Contracting and the Aerospace Sector Plan', PowerPoint presentation, in possession of the authors. Note that the weightings assigned to metrics and the relationship shown between performance and payment are purely notional and serve only to illustrate the concept.
17. J. Beck, 'Achieving knowledge-enabled logistics', presentation to the Diminishing Manufacturing and Materiel Shortages Conference, Nashville, 11–15 April 2005.
18. Aerospace Industries Association, 'Performance-based Logistics: Buying the Product Support Outcomes', ibid.
19. Department of Defence, *Aerospace Systems Division Performance Based Contracting Handbook*, 2005, foreword.
20. S. Sheedy (GPCAPT) et al., ibid.
21. Department of Defence, *The Australian Defence Aerospace Sector Strategic Plan*, p. 15.
22. Of note is that the process of contracting TLS support for existing aerospace platforms is not complete with further support outsourcing yet to occur for the AP3-C and C-130 weapon systems. S. Sheedy (GPCAPT) et al., ibid.
23. The ADASSP envisages consolidation to only two or three through-life-support prime contractors within the Australian defence industry. See Department of Defence, *The Australian Defence Aerospace Sector Strategic Plan*, p. 1.

24. e.g., the contract with Australian Defence Industries at St Marys for the repair of aircraft radomes.

25. e.g., the contract with Raytheon Australia for the support of C-130 and F-111 avionics systems.

26. e.g., the contract with Australian Aerospace for the support of the Tiger Armed Reconnaissance Helicopter.

27. Data is approximate and has been collated from a wide variety of sources including the Defence internet site.

28. While no exact definition exists, an aircraft is generally considered to be 'ageing' when it reaches the fifteen year threshold—sourced from C.K. Crowley (WGCDR), 2005, 'Balls to juggle, bathtubs to plot & journeys to finish'.

29. J.R. Velarde (MAJ) et al., 'Responding to the ageing aircraft challenge—The practical application of a refreshed philosophical basis for meeting the ageing aircraft challenge within Army aviation', paper presented to the US DoD Joint Council on Ageing Aircraft Conference, California, 31 January–3 February 2005, pp. 1–2.

30. C.K. Crowley (WGCDR) & R. Heslehurst, ibid., p. 3.

31. C.K. Crowley (WGCDR) & R. Heslehurst, ibid., p. 5.

32. J.R. Velarde (MAJ) et al., ibid., p. 11. and C.K. Crowley (WGCDR) & R. Heslehurst, ibid., p. 11. The overall trend is for support lives to diminish. 1960s electronics technology had a support life of approximately 30 years while 1980s technology a support life of ten years.

33. C.K. Crowley (WGCDR), 2005, 'Balls to juggle, bathtubs to plot & journeys to finish'.

34. Personal experience from Maritime Patrol Systems Program Office (MPSPO).

35. C.K. Crowley (WGCDR) & R. Heslehurst, ibid., p. 4.

36. ibid., p. 11.

37. The variation in contracted scopes of work is typified by a contract with Australian Defence Industries for the repair of aircraft radomes at one extreme and a contract with Australian Aerospace for the total logistics management and deeper maintenance of the Caribou aircraft fleet at the other extreme.

38. The contract is held by Raytheon and encompasses the provision of deeper maintenance and logistics support activities for the SRSPO and ALSPO Avionics Business Unit.

39. Both CO SRSPO and the Raytheon program manager for the AVBU contract expressed frustration during interviews with the administrative effort required to manage CCPs that are intended to address individual reliability and obsolescence issues.

40. Reliability improvement related process interfaces include the requirement for Commonwealth approval of all design changes, even if form, fit and function of the item is unaffected.

41. A practice noted by McLennan ten years ago. See P. McLennan (SQNLDR), *Preparedness and the maintenance function*, Air Power Studies Centre, Canberra, 1995, p. 83.

42. This view was affirmed in discussions with Mr Mark Harling regarding Raytheon Australia's motivation to incorporate PBC features within the extant F-111 avionics support contract.

43. Department of Defence, *DMO Company Scorecard Policy Statement*, Defence Materiel Organisation, Canberra, 2005.

44. Measured from time of intent to pursue to time of implementation. Based on personal experience of administrative effort required to develop, negotiate and have approved major contract change proposals within DMO.

45. US experience suggests that a five to ten year contract period is the minimum required to attract serious industry interest in pursuing reliability based profits. Department of Defense (USA), *Performance Based Logistics*, p. 41.

46. Planned Withdrawal Dates obtained from Department of Defence, *Defence Capability Plan 2004–2014*, Canberra, 2004, pp. 45, 61 and Department of Defence, *F-111 Weapon System Support Plan*, SRSPO, RAAF Base Amberley, 2005.

47. The F-111/C-130 AVBU contract encompasses over 1,400 discrete F-111 avionic Repairable Items alone. Department of Defence, *Contract Number V310009—Provision of Deeper Maintenance and Logistics Support Activities for the SRSPO and ALSPO Avionics Business Unit*, Amendment No. 12, Annex F.

48. Personal experience from management of preparedness functions within MPSPO.

49. Due to aggregation with the presumably acceptable availability rates of other RIs.

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