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TECHNICAL REPORT

The Acquisition Cost-Estimating Workforce

Census and Characteristics

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Prepared for the United States Air Force

RAND PROJECT AIR FORCE

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Summary

Previous work by PAF has documented both the creeping growth in the cost of military acquisition systems and the factors that contribute to this growth, including inappropriate initial estimated costs, underestimated technical risks, government decisions that led to program changes, and lack of independence of cost analysts from the program offices. Recommendations to improve cost estimation have included instituting independent program reviews, emphasizing technical risk assessment, and requiring major estimates to be led by experienced and qualified government analysts (Arena et al., 2006; Younossi et al., 2006 and 2008; Bolten, 2008).

Echoing some of these recommendations, in 2007 Congress dictated that cost estimates for MDAPs and MAIS programs be performed by properly qualified members of the armed forces or full-time employees of the DoD (U.S. Congress, 2007). To provide information toward eventually meeting this mandate, PAF was asked to collaborate with SAF/AQX and AFCAA to conduct a census of the acquisition cost-estimating workforce, describe its background and competencies, and assess its operational needs.

In January and February 2008, we conducted a comprehensive census of the military, government civilian, and contractor staff who self-reported that they were performing cost-estimation tasks in the Air Force's four product centers and three logistics centers: Air Armament Center (AAC), Aeronautical Systems Center (ASC), Electronic Systems Center (ESC), Space and Missile Systems Center (SMC), Oklahoma City Air Logistics Center (OC-ALC), Ogden Air Logistics Center (OO-ALC), and Warner-Robins Air Logistics Center (WR-ALC). We also conducted interviews with commanders in three of the four product centers.[1] In most instances, these commanders were accompanied by their chief cost estimator and/or chief financial manager. We also held focus groups with a sample of cost estimators.

In the interviews and focus groups, we asked about the adequacy of the size and quality of the cost-estimating workforce, its desirable composition and mix, the background and training requirements for cost estimators, and future requirements for the cost-estimating workforce.

Census Results

As of winter 2008, there were 374 cost estimators in the seven Air Force product and logistics centers, split about evenly between organic (government civilian and military) staff and contractors. In addition, there were 74 unfilled organic cost-estimator positions, comprising

[1] Per agreement with SAF/AQX, we did not interview staff at the smallest of the four product centers and at the logistics centers because of the small number of cost estimators in these centers.

29 percent of all organic positions. Nearly three-quarters of these unfilled positions were for civilians, and one-quarter were for military officers (see pp. 5–6).

About two-thirds of cost estimators reported spending 75 percent or more of their time on cost-estimating tasks over the six months preceding the census. About one-quarter of cost estimators reported spending less than 50 percent of their time on cost-estimating tasks (see p. 12).

A majority (two-thirds) of the cost-estimating workforce had an advanced degree, typically a master's degree in business administration, finance, or accounting. Fifteen percent of cost estimators—nearly all of them contractors—reported having a degree in engineering or mathematics (see pp. 8–9).

One-half of the organic workforce had five or fewer years of cost-estimating experience and 30 percent had 11 or more years of experience. In contrast, one-half of the contractors had more than 11 years of experience, and about one-quarter had less than five years of experience (see pp. 9–10).

Nearly all (80 percent) of the workforce reported having received some formal cost-estimating training, although they reported that this training was not extensive. The organic workforce received most of its training under the Acquisition Professional Development Program (APDP), which offered only two short courses in cost estimation. The centers themselves have no current capability to offer additional training. Contractors received training from multiple sources, including APDP. Two-thirds of the cost-estimating workforce, both organic and contracted, reported having no certification in cost-estimating (see pp. 10–11).

Forty-five percent of cost estimators reported being lead estimators. There were no marked differences between organic lead estimators and organic estimators who were not lead estimators. About 50 percent of both organic lead estimators and those who were not had five or fewer years of cost-estimating experience. In contrast, contractor lead estimators were more likely to have 11 or more years of cost-estimating experience than those contractors who were not lead estimators (68 versus 40 percent) (see pp. 13–14).

Nearly all Acquisition Category I (ACAT I) programs had a lead estimator assigned, as did two-thirds of ACAT II programs and about 40 percent of ACAT III programs (see pp. 15–16).

There were notable variations across product centers in the patterns described for the cost-estimating workforce as a whole, including the following:

- The cost-estimating workforce was primarily contracted at ESC and primarily organic at AAC and ASC.
- ASC had the largest proportion of cost estimators with a master of business administration (MBA) degree (44 percent).
- Sixteen percent or less of the cost-estimating workforce at AAC and SMC had 6 to 10 years of experience, suggesting that these centers may encounter greater difficulties than other centers in filling positions that require senior-level experience.
- ESC's organic and contracted staff were more likely than those of other centers to spend 75 percent or more of their time on cost-estimating tasks.
- Among product centers, AAC and SMC had the lowest proportion of lead cost estimators in their workforce (42 and 27 percent, respectively), and ESC had the highest (65 percent).

- None of SMC's contracted cost estimators were lead estimators, while at ESC, 72 percent of the lead estimators were contractors. AAC and ASC were also more likely to use organic staff than contractors as lead estimators (82 and 61 percent, respectively).
- At SMC, where many lead estimators were military, nearly three-quarters had five or fewer years of experience.
- Only one-third of ACAT II programs were assigned a lead estimator at AAC and SMC. Almost two-thirds of ACAT III programs at ESC had a lead estimator.

Workforce Adequacy, Composition, and Competencies

All three centers where interviews were conducted relied primarily on contractors to meet their cost-estimating requirements, regardless of the share of organic cost estimators at the center. ESC, whose cost-estimating workforce is less than 25 percent organic, has little choice but to rely almost entirely on its contractors to meet its cost-estimating needs. Although nearly two-thirds of ASC's cost-estimating workforce is organic, its groups nevertheless reported relying primarily on contractors to provide leadership and experience to meet their programs' cost-estimating needs. ASC's organic cost-estimating staff are financial management (FM) generalists, reportedly to maintain flexibility to respond to day-to-day work requirements and to facilitate the integration of cost-estimating and FM functions. Similarly, the actual cost estimation at SMC is typically done by contractors, while organic staff are self-described "cost managers" who oversee several contractor cost estimators (see pp. 18–19).

The three centers estimated an aggregate need for a minimum of 70 cost-estimator authorizations, in addition to the 74 vacant authorizations they currently hold. Although wings and groups may hire additional contractors to fill some of these gaps, in practice they said they are constrained by contract cost ceilings set by the center,[2] higher center or wing priorities on contractors in other functional areas such as engineering, and the need to use program funds to cover the costs of contractors (see pp. 19–20).

Most commanders said they would prefer to have a higher ratio of experienced organic cost estimators to contractors, so that the organic staff would have the experience to take the lead role in performing cost estimates and/or reviewing contractors' estimates. They typically would prefer a 50/50 ratio of organic to contractor staff (see p. 20).

Two workforce-mix issues were raised by our respondents. The first concerns the distribution of the organic workforce by years of experience. One-half of organic cost estimators have five or fewer years of experience and one-third have more than ten years, leaving a gap in the middle. This gap is caused in part by centers' inability to hire mid-level cost analysts to fill currently vacant positions and in part by the low retention rate of organic cost estimators, which is attributed to a lack of career opportunities in this specialty. The cost-estimating workforce forms only a small proportion of the FM field, which offers greater advancement opportunities in other specialties. Thus, it is unattractive for junior staff to enter a cost-estimating career (see pp. 20–21).

The second workforce-mix issue concerns the trend toward the use of organic FM generalists for cost-estimating tasks and the lack of career advancement opportunities for cost esti-

[2] At ASC, the contract is centerwide. At ESC and SMC, there are separate contracts for each wing, but these centers have authority to set the contracts' dollar ceilings.

mators. Several commanders and chief cost estimators felt that cost-estimating is a specialty that requires more preparation, development, and experience than is feasible for FM generalists (see p. 21).

Nevertheless, respondents were generally satisfied with the competencies of their current organic cost-estimating workforce, and even more so with their contracted cost-estimating workforce (see p. 21).

Most respondents placed a greater weight on years of experience in practicing cost-estimating and detailed knowledge of the programs than on the background of their cost estimators. Still, there was a consensus among respondents that an engineering or technical background is desirable, although it was not deemed absolutely necessary. They also said that greater expertise was needed in risk assessment analysis, systems integration, scheduling, and cost-estimating for software programs (see p. 21–22).

Respondents said that organic cost estimators lacked adequate training. Currently, most of their training occurs on the job as they work with experienced cost estimators who are primarily contractors. Respondents generally estimated that it takes about five years for a cost estimator to become "competent" at performing cost estimates for complex programs. The cost-estimating training courses offered by the Defense Acquisition University were said to be too general and lack depth. Separate training courses are needed in source selection, integrated baseline reviews, program office estimates, risk analysis, scheduling, software cost-estimating, and operations and support. Respondents suggested making greater use of case studies in training courses. In contrast, respondents praised the solid analytical preparation of Air Force Institute of Technology (AFIT) graduates, who needed less time to acquire the knowledge required for cost-estimating (see pp. 23–24).

Two other issues require particular attention in coming years: (1) the continuing trend toward more dependence on software than on hardware, which will increase the demand for cost estimators who specialize in software programs, and (2) the desirability of reengaging in more-systematic collection of cost data and research in cost estimation. The Air Force will need to address most, if not all, of these issues in a concerted manner if it is to eventually meet the requirement of Section 820 of the NDAA for cost estimators.