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CHAPTER THREE

Literature Review on the Costs and Benefits of Different Categories of Personnel

DoD guidance is that risk mitigation takes precedence over cost-savings in choosing different personnel categories, and civilian manpower is the preferred source of personnel unless a cost analysis shows that this source is not the lowest-cost source. This chapter presents information relevant for conducting such a cost analysis. We draw on information in the economics literature, past defense manpower studies, and recent guidance from the Office of the Secretary of Defense, Cost Assessment and Performance Evaluation (CAPE). We use the CAPE guidance because it is the current guidance on determining manpower mix in DoD. Other guidance is available, such as the cost estimating and assessment guidelines provided by the U.S. Government Accountability Office (GAO, 2009), but that guidance is quite general and not specifically focused on manpower mix issues. Dahlman (2007) considers the cost of a military person-year, focusing on how changing the method for computing the expected retirement liability of military personnel from that used by the DoD Office of the Actuary can result in different cost estimates and manpower mix decisions. There have been some critiques of the CAPE guidance, and we discuss these later in the chapter.

We incorporated the information in this chapter into the interview protocol and the exploratory cost analysis, and used the information to better understand the responses we get from the interviews. The discussion begins by first considering how to measure cost and benefit, both in terms of resolving some broad issues in cost and benefit measurement as well as in terms of assessing specific cost elements. It then considers the typical major drivers of the cost and benefit of different categories of personnel and why they are relevant.

Broad Issues to Consider When Measuring Costs and Benefits

There are four broad questions that should be addressed when measuring the costs and the benefits of different categories of personnel (Palmer et al., 1992; Robbert, Williams, and Cook, 1999; Gotz et al., 1990):

- Cost or benefit to whom?
- Cost or benefit over what time horizon?
- Cost or benefit of what?
- Average cost or the change in cost?

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Cost or Benefit to Whom?

Because agencies are concerned about their own budgets, they will tend to focus on their own costs and benefits and ignore any spillover or intergovernmental transfers across agencies. However, from the standpoint of efficiency and maximizing the effectiveness of taxpayer resources, the relevant concept is the cost or benefit to the taxpayer. This issue is particularly relevant in the IC, where agencies may use both military and civilian personnel. A given workforce mix decision might reduce personnel costs for the agency of interest, but have an indirect spillover effect that increases military personnel costs to DoD. Because the agency does not account for the spillover effect on DoD, it may choose a workforce mix that results in an overall higher cost to the taxpayer while reducing the cost borne by that agency. For this reason, the research sponsor in ODNI requested that we consider the relevant costs and benefits to the government as a whole, and therefore the taxpayer, rather than to one specific agency or functional area.

That said, given that agencies will tend to take an agency-specific perspective in making cost-effectiveness comparisons, implementing a government-wide perspective in costing analysis would be nontrivial and require a change in the policy and guidance that agencies follow. For example, a possible (radical) implementation strategy for taking a government-wide perspective in manpower decisions in the IC is to make ODNI the sole resource provider of the entire IC workforce, not unlike a military service that funds personnel centrally and then allocates manpower to organizations within the service. Questions of implementation are important and could be a useful area for decisionmakers to consider, but such questions are beyond the scope of this report. Beyond implementation, the assessment of the costs and benefits of different workforces could differ from an agency perspective versus from a government-wide perspective. Thus, it is important to recognize that our results are applicable at the government, but not necessarily at the agency, level.

Cost or Benefit Over What Time Horizon?

Regarding the second question, the time horizon over which costs and benefits are computed is important because a focus on the short term will potentially ignore important future costs or benefits. Specifically, the time horizon should be long enough to incorporate the career patterns of personnel, because careers can differ significantly across different personnel types. For example, military personnel have shorter careers on average than government civilians, but military personnel have some chance of transitioning to the civilian or contractor workforce upon separation from the military. Consequently, a given number of military personnel may provide work years, and hence contribute to performance in the IC, well beyond those years provided while serving in uniform. Thus, the contribution of military personnel to mission readiness or accomplishment must incorporate their civilian career contributions. On the other hand, because civilians have longer careers and are more experienced, fewer civilians would be required to achieve a given level of readiness or performance, fewer civilian accessions will be needed to sustain a civilian force of a given size, and training and accession costs are amortized over more work years.

Similarly, career-related costs may differ by personnel type. Retirement costs for military and civilian personnel are realized in the future as a result of using personnel today. The DoD Office of the Actuary computes an actuarial cost of the active military retirement benefit that is allocated across the active force so that, over a typical career, sufficient funds are placed in

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the military retirement fund to cover expected retirement costs.[1] The Office of Personnel Management actuary makes a similar actuarial calculation of the cost of the civil service retirement programs.

Cost or Benefit of What?

Regarding the third question, assessments of the best workforce mix should focus on computing the costs and benefits of achieving a desired level of mission performance or accomplishment using different types of personnel. Because of performance or cost differences across type, the cost or benefit of achieving a desired state of readiness or mission accomplishment may require different numbers of personnel of each type. For example, if the average civilian employee provides greater language capability than an average military member, or stays in service longer, then fewer civilians are needed than military personnel to achieve a given mission objective.

Average Cost or the Change in Cost?

Regarding the fourth question, assessments of workforce mix should focus on the incremental costs or benefits of meeting a desired level of mission readiness or accomplishment with different personnel types rather than the total or average costs or benefits. The reason is that some costs and benefits, such as base operating costs, are common to all types of personnel, so these costs and benefits do not affect the change in cost among different mixes of personnel. Similarly, some factors affecting readiness, such as overhead costs or the operational environment, are fixed and do not depend on the type of personnel used, and these costs and benefits should be excluded as well. Thus, the scope of the analysis should be on the relative cost and benefits of personnel rather than the absolute levels.

Though the analysis should not include fixed factors that do not change as personnel types change, the analysis should incorporate changes in overhead costs or factors that affect benefits if they change as a result of the change in the mix of personnel. For example, to the extent that changes in the personnel mix involve major changes in infrastructure and technology, then the analysis should include the changes in these investments.

Specific Cost Elements

DoD Directive-Type Memorandum (DTM) 09-007 provides information on the cost elements and methodology for estimating and comparing the full cost to the government of DoD manpower (i.e., military and government civilian manpower), and of contractor services to make workforce mix decisions. We use this information in estimating cost of military and civilian personnel in our cost-effectiveness modeling in Chapter Five.

There are two groups of cost elements to consider for DoD manpower (i.e., military and government civilian personnel): direct costs and indirect costs. Direct costs are payments made for resources and assets that are used by the function under consideration. Indirect costs are payments made for resources and assets that support the function but are not directly attribut-

[1] Past studies have criticized the DoD actuarial methodology for evaluating the cost of a military work year, and demonstrated alternative, more accurate, approaches to incorporating retirement costs into the cost of a military work year (Dahlman, 2007).

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able to the function under consideration. Within each of these categories, direct versus indirect, are different factors.

Direct costs can be further divided into labor versus non-labor costs and within the labor category. Direct non-labor costs are costs that are not labor-related but are driven by the number of personnel in a workforce; for example, office space. Direct labor costs include those that are paid for by DoD and those incurred by other federal agencies. Because the focus of our analysis is on the cost to the taxpayer, we include both costs to DoD and to other agencies, including the Treasury. Table 3.1, copied from Table 1 in DTM 09-007, lists the elements of direct labor costs for military and civilian personnel.

Each row in the table corresponds to a type of direct labor cost: short-run variable costs, short-run fixed costs, and deferred pay-as-you-go costs. Short-run variable costs are those that

Table 3.1
Direct Labor Cost Elements for Military and DoD Civilian Personnel

	Military		Civilian	
Cost	**DoD**	**Other Federal Agency**	**DoD**	**Other Federal Agency**
Variable costs in the short run	Basic pay Allowances and special pays Health benefit, active duty and dependents Social Security and Medicare Retired pay (accrual) Travel (PCS) transportation subsidy Education assistance Health benefit retiree (>65 MERHCF accrual) Training costs (amortized over years of practice) Recruitment, advertising, etc. (amortized)	Concurrent receipt (Treasury) Military Retirement (Treasury) MERHCF (Treasury) Child education (Education)	Basic pay/locality pay Allowances and special pays Incentive/Performance awards Health benefit (government share of FEHBP) Social Security and Medicare Retired pay (government share) Travel/PCS/ transportation subsidy/ relocation bonus Education assistance Overtime/holiday/other pays Life insurance/worker's compensation benefits Recruiting, advertising, etc. (amortized)	
Fixed costs in short run	Child development Family support services Discount groceries		Child development	
Deferred pay-as-you-go costs	Health benefit, retiree (<65 retiree and family) Health benefit, other (TAMP and CHCBP) Discount groceries, retiree Separation pay and travel Unemployment benefits Death gratuities Survivor benefits	VA benefits (Veterans Affairs) Employment training (Labor)	Severance health benefit Severance pay/incentive	Retirement benefit (CSRS unfunded) Health benefit Life insurance benefit

SOURCE: Directive-Type Memorandum 09-007, Table 1 (Department of Defense, 2010).
NOTES: PCS = Permanent Change of Station; MERHCF = Medicare-Eligible Retiree Health Care Fund; FEHBP = Federal Employees Health Benefits Program; FEHBP = Federal Employees Health Benefits Program; CSRS = Civil Service Retirement System; TAMP = Transitional Assistance Management Program; CHCBP = Continued Health Care Benefit Program.

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are directly related to and are driven by the number of people in a workforce, such as basic pay. Short-run fixed costs are costs associated with services or goods that are not directly related to workforce size but may be adjusted over time if the size of the change in the workforce and the time horizon is long enough to justify a change, such as day-care centers and commissaries. Deferred pay-as-you-go costs are costs incurred in the future that are associated with workforce decisions made today. For example, health benefits for military retirees who are not eligible for Medicare is a pay-as-you-go cost; the liability incurred today of using personnel is paid for later when those personnel retire and become eligible for those health benefits.

Turning to indirect costs, these are cost elements that are not directly associated with the function under consideration but that could change as a result of workforce size or mix decisions. Often, these are the cost of support activities, such as overhead costs, or the fair share of support costs if those activities also support other functions not under consideration. For example, legal services; accounting; human resources; and cleaning, maintenance, and facilities-related services could all be considered indirect cost elements. Because indirect costs are unlikely to change much with workforce mix decisions, we ignore them in our exploratory analysis in Chapter Five.

In addition to direct and indirect costs, there may be miscellaneous other costs that are affected by workforce size and mix and that should be incorporated into a cost analysis. DTM 09-007 discusses the need to include implementation and transition costs that are not common to both alternative workforces under consideration. For example, the cost of relocating civilian employees as a result of a workforce mix decision would be a miscellaneous implementation cost.

DTM 09-007 also discusses the cost elements of a contractor workforce. Because NSA/CSS does not use a large contractor language workforce, relative to the overall language workforce, we ignore this group in our analysis of cost-effectiveness in Chapter Five. For completeness, and because other IC organizations use contractors, we mention here some of the key cost elements associated with contractors.

The full cost of a service contract is the negotiated price of the contract plus additional indirect costs. According to the guidance, the contract price, in turn, should include direct costs (labor and non-labor) as well as indirect costs borne by the contract, such as overhead costs, plus an allowance for profit. The full cost should also include additional indirect costs that arise as a result of using a service contract. For example, it should include the (fair share of the) cost of goods and services provided in-kind to the contractor and the cost of services performed by DoD to support the contract, such as administration and oversight activities.

Finally, DTM 09-007 provides guidance on computing the cost of manpower conversions (e.g., military to civilian or vice versa) versus the cost of a DoD manpower workforce relative to a service contract. The cost of a conversion (such as military to civilian) should include all direct and indirect labor costs that are not common to both categories of personnel, assuming the workforce size stays constant. If the size varies, then adjustments must be made to account for the difference. The guidance states that cost comparisons between DoD manpower and the contractor must account for whether the activity is performed off-site or on a government site. If performed on-site, then the guidance says that common costs for equivalent numbers of government and contractor personnel can be excluded. If performed off-site, the full cost of a service contract must include additional expenses the government incurs when a service contract is used rather than when the activity is performed by government workers.

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Berteau et al. (2011) critique the DoD guidance and provide a list of its shortcomings. Their main criticism is that the guidance focuses on the cost to DoD and leaves out costs and savings that could accrue to other federal agencies. Other shortcomings raised by the study include issues related to the treatment of foregone tax receipts to the Treasury or state and local governments, the exclusion of the cost of DoD-owned capital for government workforces but not contractors, and the failure to account for the risk of cost growth and for varying workload stability. Berteau et al. argue that OMB Circular A-76, the cost comparison methodology used by DoD prior to DTM 09-700, provided a better basis for performing cost comparisons but also has some flaws. The provides their own cost estimation methodology to address these flaws and shortcomings.

Chapter Five presents our exploratory cost analysis. The analysis focuses on direct labor cost elements, including those listed in the DTM and Table 3.1. The direct labor cost we use is the cost to the government, regardless of which agency pays the cost (DoD or NSA/CSS). Because the analysis is exploratory and does not include other cost elements, such as overhead costs, material costs, and capital costs, Berteau et al.'s (2011) criticisms related to those issues are not relevant to the cost analysis in Chapter Five.

Factors That Drive Cost and Benefit of Different Personnel Categories

We also sought information from the available literature on the drivers of the cost and benefits of different personnel categories and the reasons behind them. In this subsection, we review the broad literature on the major conceptual factors affecting cost-effectiveness and why they are relevant. We investigate whether these factors are important for language capability in the IC in later chapters. We incorporate these factors in our interview protocol and exploratory analysis.

Differences in the costs and benefits of using different personnel may stem from differences in productivity, according to the labor economics literature. The term *productivity* refers to the array of ways that personnel contribute to readiness and effectiveness, which can include not just the amount of work performed but also other dimensions, including the quality of work, timeliness, and responsiveness. Some of the major factors identified by the literature that may affect productivity, and therefore drive cost and benefit, include knowledge, skills, and abilities; availability and flexibility; incentives; and miscellaneous factors.

Knowledge, Skills, and Abilities

One important factor affecting productivity, according to human capital theory, is the knowledge, skills, and abilities of personnel (Borjas, 2005). The cost of personnel is affected by knowledge, skills, and abilities; to attract and retain personnel who know more, are better skilled, and are more able, the government faces pressure to raise pay. According to the literature, differences in knowledge, skills, and ability reflect an array of underlying factors, such as training, education, heritage and ethnicity, and the amount and type of job experiences.

As shown in Appendix C, military and civilian personnel have significantly different expected years of experience overall, and this is particularly the case with signals intelligence skills. The armed forces are composed of mostly junior personnel, a reflection of the "youth and vigor" culture of the military, where most military careers are short; even for those who stay until retirement, the retirement system gives an incentive to retire after 20 years (Warner,

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2006). On the other hand, military retirees typically have a second career in the civilian sector, including government service, before they retire completely from the labor force. In contrast, civilian personnel may spend their entire working career in the civil service, though possibly in different agencies or work centers, until they retire. While some civilian retirees may continue to work after they retire from the civil service, such employment does not usually constitute their major employment during their career.

In the case of language capability, the focus is naturally on knowledge, skills, and abilities with language. However, other capabilities may also affect the productivity of different categories of personnel (Borjas, 2005). These might include knowledge of the operational environment, knowledge of specific technologies or information systems, country or cultural expertise, or different analytical skills to analyze and report intelligence (in English). How knowledge, skills, and ability affect productivity may be influenced by other factors, such as technology, that, in turn, may vary with personnel category.

Military, civilian, and contractor personnel may have different knowledge, skills, and abilities. Current and former military personnel have capabilities that are specific to the military, such as knowledge of language specific to military operations. Government civilian personnel in the IC are generally more experienced and are four-year college graduates, and they may be more experienced supervisors and mentors. Contractors may be heritage speakers and have better familiarity with slang and colloquialisms. These examples are only some of the ways that military, contractor, and civilian personnel might differ in their knowledge, skills, and abilities; we seek to identify such differences as part of our qualitative and quantitative analysis.

Availability and Flexibility

Productivity may differ across personnel types because of differences in the availability and the flexibility of employing different personnel types. Availability and flexibility are the results of the policies and practices that affect time on the job and the ability to surge in the short term by requiring that personnel work longer hours or under more arduous conditions. These policies may include those related to the rotation of personnel in the military, deployments, overtime, and the degree to which personnel are required to participate in competing activities.

For example, rotation policies affect availability as well as productivity (Hix et al., 1998). The services rotate military personnel as part of their normal career paths. Rotation allows military personnel to gain a breadth of experiences but can be disruptive if it takes time for newly rotated personnel to be brought up to speed and learn job-specific skills.

Deployments can enhance individual skills and improve future productivity, but deployed personnel may have less time available to perform routine training or use other skills that improve productivity. All categories of personnel may be deployed, but different categories may experience differing amounts of deployment, and the negative effect of deployment on availability and flexibility may differ by category as well.

Similarly, activities such as physical training or administrative duties may serve to maintain and/or grow skills that contribute to overall future readiness. However, these activities can be unrelated to the member's current assignment, and so they may also reduce the availability of personnel during the day to complete current missions.

There may be administrative or cultural differences that lead to differences in the availability and flexibility in the use of different categories of personnel. For example, military members are generally considered to be on-call 24 hours a day, every day, including holidays

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and weekends. The "rapid response" culture of the military means that members recognize being on-call as a normal part of their military service. In contrast, civilians might expect to be paid overtime for working unusual hours. This administrative/cultural difference may not permit the flexible use of civilian personnel during off-hours.

Another potential reason for differences in the management flexibility associated with the use of different personnel types stems from limitations on federal hiring placed by Congress and the OMB. As described by Rostker (2008), these limitations mostly take the form of personnel ceilings on the number of federal employers that can make up an agency's headquarters. Thus, to hire a civilian, there must be a position and the agency must be within the ceiling. Furthermore, the hiring process in the federal civil service is notoriously long. In the case of contractors, there are no ceilings on contractor strength. If the agency can hire contractors without a competition, positions can be filled quickly, implying the potential for greater flexibility in the use of contractors over civilian employees.

Contractors may be less available to perform certain tasks that are inherently governmental. For example, according to DoD instruction, contractors are not permitted to perform quality control duties, supervision of governmental employees, and other governmental tasks. We explore whether these restrictions are important in practice in the language community in our interviews, as described in later chapters.

Incentives

Performance incentives can also affect productivity (Jensen and Meckling, 1976; Holmstrom and Milgrom, 1991, 1994; Alchian and Demsetz, 1972; Lazear and Gibbs, 2009), and to the extent that productivity differs, personnel costs differ as well. Contractor, government civilian, and military personnel are all managed under different compensation and personnel structures, so their incentives to perform differ.

The literature particularly focuses on contractor incentives and the role of incentive mechanisms and the terms of the contract in aligning contractor objectives with those of the entity letting the contract, i.e., the government. Contractors may have different incentives to perform than other categories of personnel to the extent that their contract can be terminated or not renewed relatively easily or that the incentive mechanism embedded in the contract closely ties compensation to their output. They may have stronger incentives to perform the tasks that are stipulated in their contract or that are rewarded. On the other hand, it may not be possible to stipulate in a contract every task to be performed in every possible circumstance, especially in situations where circumstances change frequently. Furthermore, there are formal procedures for selecting a contractor and terminating the contract, and the flexibility of using contractors will depend on the flexibility of these procedures.

Another issue frequently addressed in the literature pertaining to contractors is the problem of "hold-up" (Williamson, 1985; Klein, Crawford, and Alchian, 1978; Kogut and Zander, 1996; Poppo and Zenger, 1998). The theoretical literature hypothesizes that when the nature of work requires knowledge, skills, or other investments that are specific to the government or agency, contractors may have an incentive to threaten to "hold up" or stop work in order to get additional or higher payments. The theory states that, because the investment is specific, the government cannot easily hire a replacement, and, should the contractor stop work, the government may fail to realize a return on the specific investment it already made. The literature discusses how contracts may be written to mitigate this problem and identifies situations where it is less likely to be important. For example, the theoretical literature predicts that long-term

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ongoing contractual relationships are less likely to be subject to hold-up problems because a contractor in this situation has an incentive to maintain its reputation, to ensure continued employment in the future. Whether the hold-up problem is supported by the evidence and is relevant to the language community in the IC is an open question.

The literature also considers the incentives of civil service employees and military personnel. Much of the literature on incentives for government employees focuses on mitigating incentives for corruption, though a subset of studies consider incentives for enhanced productivity (Asch, 2005; Burgess and Ratto, 2003; Dixit, 2002). Unlike the literature on contractors, this literature does not consider how incentives for government workers affect workforce mix decisions.

Other Factors

Other factors may cause the benefits and costs of different categories of personnel to vary but are not easily categorized. One factor is differences in the "corporate culture" and "corporate history" that facilitates the workflow for different personnel types (Camerer and Vepsalainen, 1988; Lazear, 1995; Kreps, 1990) and can affect worker productivity and cost. In the case of the military, Carl Builder (1989) discusses the different "personalities" of each branch of service and different service cultures. The literature highlights how having a common "corporate" language, routines, procedures, knowledge, and culture among personnel can be important because they can generate efficiencies by improving the coordination of people and tasks. The efficiencies are greater when communication is imperative for the performance of the work. According to the theory, outsiders, such as contractors, are more likely to be "foreign" to the corporate culture, unless they have prior experience with the specific organization and/or worksite. As discussed in Chapter Four, our interviews revealed that many contractors at NSA/CSS are former military personnel and likely have more of an "insider" perspective. According to theory, the importance of common culture and knowledge may vary with the mission.

Another miscellaneous factor that might affect productivity and cost differences across personnel categories is differences in economies of scale or scope associated with using different personnel types. An economy of scale means that average costs decline as the size of operations increase. Economies of scale may occur if there are large initial investments or fixed costs that must be incurred to set up or maintain operations, such as a human resource system or a purchase of a building site. As the scale of operations increases, the investment is defrayed over a larger number of units (or linguists), so the average cost declines.

An economy of scope is a related concept. While economies of scale refer to declining average production costs associated with one product line, economies of scope refer to declining average costs associated with multiple product lines. Thus, if a significant investment is made that is common to all product lines—for example, the cost of establishing a marketing strategy or a building site—the cost of the investment is defrayed as the number of product lines increases.

In the case of language capability, some investments might be fixed in terms of achieving a desired level of mission or functional readiness or accomplishment, regardless of the number of language analysts hired, the language they have, or the missions they support; these fixed investments are a source of economies of scale or scope. Alternatively, there may be investments that change with scale or scope, but not in a linear fashion. These investments might include aspects of the hiring process or of assigning and training language analysts. The importance of economies of scale or scope depends on the size of fixed investments. It may be the case that

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providing language capability has relatively few fixed investments and most costs vary with the number of language analysts and their language.

One potential source of fixed costs may be related to language training. While training costs, including the cost of maintaining language skills, will vary with the number of students, some training costs may be fixed or vary nonlinearly with the number of students. For example, the cost of an instructor to teach a given language course might be the same, whether one student or ten students are enrolled in the course. Furthermore, maintaining the training infrastructure might be a relatively fixed cost. However, as the number of students increases beyond ten, more instructors might be needed to teach more courses, but the costs might not rise in direct proportion to the number of students, allowing some economies of scale and scope.

From a theoretical standpoint, it is also not always clear whether contractors or government employees can better take advantage of economics of scale or scope. Contractors who serve many clients may be able to take advantage of economics of scale. On the other hand, large operations at a specific site, or centralized operations across many sites, may allow the government to take advantage of economics of scale or scope when employing governmental employees. Empirical information about the relative importance of these factors is needed to draw conclusions about the role of economies of scale or scope.

Another factor driving personnel costs and benefits is related to the magnitude of the skill set required and the duration of the requirement. If the skill set is highly specialized—for example, a particular dialect of a difficult and infrequently used language—it may be less costly for a contractor to acquire and maintain this skill set, if the contractor serves multiple clients on an ongoing basis. In contrast, if the government's or a specific agency's need is relatively small, infrequent, or of a short duration, it may be too costly to acquire and maintain the skill set within the government or agency.

A final factor is one that is specific to using contractor personnel: the cost associated with writing effective contracts. These transaction or contracting costs are costs that are over and above the costs of production. Contracting costs include the costs of negotiating, measuring, and enforcing the terms of the contract. These costs are higher when the tasks to be performed are complex, subject to considerable uncertainty, or change frequently. Some tasks are so complex or are performed in such a dynamic and uncertain environment that it is simply not possible to contract them to the private sector because it is impossible to predict every eventuality and stipulate the appropriate action to take under each circumstance. Furthermore, some tasks cannot be contracted because of legal limits (e.g., they are inherently governmental) or because they cannot be enforced by an objective third party (such as a court of law).

Summary and Implications for Assessing Workforce Mix

We drew from the economics literature, past defense manpower studies, and a recent DoD directive and identified four broad issues that must be resolved in measuring the cost and benefit of different personnel categories, to specify the cost elements that must be considered in measuring the cost of using civilian and military personnel, and to understand the major factors that could cause costs and benefits to vary among different categories of personnel and why. Together with the DoD guidance reviewed in the previous chapter, this information provides a framework for assessing workforce mix. We use this framework to develop the interview

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protocol we use for assessing the workforce mix of language professionals in the IC, to better understand the issues raised during the interviews, and to develop our exploratory model of the relative cost-effectiveness of a military versus a civilian language professional workforce.

Specifically, the four broad questions help guide the model development. For the question of "Cost or benefit to whom?" our research sponsor guided us to focus the exploratory model on measuring the cost and benefit of different categories of personnel to the government at large, rather than to a specific agency. Regarding the question of "Cost or benefit over what time horizon?" the model computes cost at a point in time but accounts for lifecycle related costs and benefits. For example, the model accounts for different expected career lengths among military versus civilian personnel. In response to the question of "Cost or benefit of what?" the model computes the cost to the government of achieving a given level of workforce language proficiency. Finally, in response to the question of "Average cost or the change in cost?" the exploratory model computes the cost and benefit of changing the workforce mix from an entirely military workforce to one that is composed of civil service personnel.

During the interviews, we were attuned to the factors identified in the literature that can cause cost and benefits of different personnel categories. Furthermore, the interview protocol includes questions related to these factors, such as the knowledge, skills, and abilities of different categories of personnel and the factors that affect them, such as education, experience, and training. It also includes questions about complementary skills that different personnel categories may embody and includes questions pertaining to the availability of personnel, including competing duties that they may have; questions about the flexibility to use different sources of personnel; and as questions related to the miscellaneous factors that can drive cost and benefit. That said, not every factor was discussed in every interview, and while we used the interview protocol as a guide, we also delved into more detail on subjects considered important by the interviewees, so not every topic was discussed at each interview.

We discuss the results of our interviews in the next chapter and the results of the exploratory model in Chapter Five.

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