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Contingency Contractor Optimization
Phase 2, Use Cases and Workflows
Strategic Contractor Planning Tool Prototype

Alisa Bandlow, Kristin L. Adair, Jared L. Gearhart, Dean A. Jones, Katherine A. Jones, Nathaniel Martin, Nadine E. Miner, Alan S. Nanco, Linda K. Nozick

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Use Cases and Workflows
Strategic Contractor Planning Tool Prototype

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Abstract

This document addresses how the Strategic Contractor Planning Tool prototype meets the requirements set forth in the Contingency Contractor Optimization Phase 2, Tool Requirements Document. The document describes the rationale behind the development and selection of user roles, use cases, workflows, output graphs, and storyboards.

The Strategic Contractor Planning Tool prototype was developed to support strategic planning for contingency contractors. The planning tool uses a model to optimize the Total Force mix by minimizing the combined total costs for the selected mission scenarios. The model will optimize the match of personnel types (military, DoD civilian, and contractors) and capabilities to meet the mission requirements as effectively as possible, based on risk, cost, and other requirements.

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NOMENCLATURE

COCOM	Combatant Command
DOD	Department of Defense
DoDI	Department of Defense Instructions
DOE	Department of Energy
FTE	Full-Time Equivalent
JCA	Joint Capability Area
OCS	Operational Contract Support
TPFDD	Time-Phased Force & Deployment Data
U.S.	United States

1. INTRODUCTION

The Contingency Contractor Optimization project is intended to address former Secretary Gates' mandate in a January 2011 memo [1] and DoDI 3020.41 [2] by delivering a centralized strategic planning tool that allows senior decision makers to quickly and accurately assess the impacts, risks, and mitigation strategies associated with utilizing contract support.

The Strategic Contractor Planning Tool prototype was developed to support strategic planning for contingency contractors. The planning tool uses a model to optimize the Total Force mix by minimizing the combined total costs for the selected mission scenarios. The model will optimize the match of personnel types (military, DoD civilian, and contractors) and capabilities to meet the mission requirements as effectively as possible, based on risk, cost, and other requirements.

The use cases were developed to support entry of the required inputs into the planning tool (section 2.1. Required Inputs). Interviews with key stakeholders informed the development of user roles (section 2.2. User Roles), use cases (section 2.3. Use Cases), and workflows and storyboards (sections 3-4).

Stakeholder interviews also identified additional questions and concerns they hoped to address with strategic planning:

- What is the impact of overlapping missions (no overlap, some overlap, considerable overlap)?
- What is the impact of changes in resource availability due to:
    - Changes in policy?
    - Changes to force caps on the active and reserve military?
    - Changes in FTE availability of DoD civilians?
- What is the impact of limitations on the use of contractors due to:
    - Changes in policy?
    - Operational risk of using contractors?
    - Budget constraints?

These questions informed the selection and development of model results and graphs (section

2.4. Model Results).

2. PLANNING TOOL REQUIREMENTS

The Contingency Contractor Optimization Phase 2, Requirements Document [3] states that the Department of Defense (DoD) has been required to improve its centralized planning capabilities for using contractors to support future military operations. Annex W (a part of the combatant command operation plan) requires estimates of the numbers and types of contractors to be used to support that operation. In order to improve strategic contractor planning and contractor estimates, the planning tool needs to be cognizant of the constraints on the entire workforce and not be solely focused on contractors. The planning tool uses a model to optimize the Total Force mix by minimizing the combined total costs for the selected mission scenarios.

2.1. Required Inputs

The required inputs can be organized into two main categories: "set up" data and analysis data. These required inputs are described in more detail in the Contingency Contractor Optimization Phase 2, Requirements Document.

2.1.1. Planning Tool Data Elements

Input data within the planning tool is organized into two major data elements.

Mission Scenarios - A mission scenario represents a single mission, ranging from disaster relief and humanitarian assistance to a major combat operation. The mission scenario in the planning tool is focused on the capability requirements by phase needed to implement the mission. Using the capability requirements, policies, and risk settings, the planning tool will calculate an optimized workforce mix to support the mission.

Planning Baseline - A planning baseline is a group of mission scenarios that analysts consider in their planning.

2.1.2. Set Up Data

While the goal of the planning tool is to optimize workforce mix, a great deal of information must first be entered into the planning tool.

Mission scenarios are the main data source for the planning tool. However, mission scenarios are written as narrative text, which is not an ideal input format for the planning tool. Therefore, a person will be needed to translate the narrative mission scenario details into inputs for the planning tool. These inputs include:

- Time Phased Force and Deployment Data (TPFDD)-like input and logistics support input
- Start date
- Phase durations
- Operational risk assessments of using contractors

Another large category of required inputs involves data about the entire workforce. These inputs are required so that the planning tool can model the optimized workforce mix while minimizing

total cost. The planning tool must be given enough input data to know when there is competition for resources, what constraints there are on using different types of personnel groups to fulfill the need for a capability, and what the availability is of military personnel for a given capability. As identified in the Contingency Contractor Optimization Phase 2, Requirements Document, these inputs include:

- Personnel groups and costs
- FTE availability by personnel group for all capabilities
- Manpower Mix criteria
- Laws, executive orders, and treaties that impact manpower decisions

Since there are few readily available or accessible data sources for the above inputs [4], a majority of the use cases identified involve manually entering this data into the planning tool.

2.1.3. Analysis Data

Once all of the set up data has been entered, then the what-if analysis can begin. The set up data values should be treated as default values that can be modified to perform what-if analyses. The longer term nature of the strategic planning process means that the exact conditions for future scenarios are uncertain. Specific inputs that should be modifiable include:

- Number of people available by personnel group and capability category
- Annual overall budget
- Mission scenarios to include for analysis
- Start date for each mission scenario
- Phase durations for each mission scenario (in months)
- Acceptable operational risk of using contractors for each mission scenario
- Laws, executive orders, and treaties by mission scenario

2.2. User Roles

The two major categories of input data have been mapped to two user roles, the planning manager and the analyst. The planning manager is responsible for entering the set up data, and the analyst is responsible for entering the what-if analysis data.

2.2.1. Planning Manager

The planning manager is in charge of creating new planning baselines and adding and creating the relevant mission scenarios. The planning manager is expected to have enough knowledge about the mission scenarios to be able to set reasonable default values. Planners at the combatant command (COCOM) or service level, who are very familiar with the mission scenarios, would be well-suited for this role.

2.2.2. Analyst

The analyst is a planner who will be using the planning tool to perform “what-if” analyses. Through these analyses, the analyst will be able to provide estimates on the number of

contractors needed in order to minimize cost while meeting the mission requirements, what capabilities the contractors will need to have, and when they will be needed in theater.

There are two types of planning that can be performed with the planning tool. First, the analyst can perform planning limited to scenarios within a COCOM or service. Second, the analyst can perform an integrated, centralized analysis using scenarios across all COCOMs and all services.

2.2.3. Administrator

A third, minor role, is the administrator. The administrator can perform all of the planning manager's activities. However, there are high-level parameters within the planning tool that should remain constant across all analyses. Only the administrator can access these parameters. The administrator also helps to maintain the planning tool and to manage user access to the planning tool.

2.3. Use Cases

In developing the use cases, the required inputs (values that have to be set), customer needs from the planning tool (which informed the model results shown), and how the end users would like to interact with the model results were considered [3]. First, high-level workflows were developed to outline potential activities for the planning tool. Once the team agreed upon the main tool activities, task-level use cases were developed to support the major activities. Use cases are organized around major elements of the planning tool (planning baseline, mission scenarios, etc.). The project team decided which uses cases would be included in this planning tool prototype and which user roles would perform each use case. Finally, detailed storyboards were developed to show how the tasks would be implemented in the interface. The storyboards are organized by user role.

2.3.1. Workflow and Use Cases for Setting up a Planning Baseline

The planning tool is organized around two main data elements, planning baselines and mission scenarios. Mission scenarios correlate to DoD missions, and planning baselines are a collection of mission scenarios. Figure 1 shows the high-level workflow for setting up a planning baseline. Table 1 shows the use cases for setting up a planning baseline. Table 2 shows the use cases for setting parameters for a mission scenario. As shown in the Figure 1 workflow, setting mission scenario parameters (step 5) is a task within setting up a planning baseline. Note that the analyst role is not involved with any use cases in these two tables. "Set up" tasks are the domain of the planning manager and administrator.

In both tables, the "Include in Prototype?" column shows whether or not the use case will be included in the planning tool prototype. The last four columns, under "Who will perform the use case", show which user roles will perform each use case. If "Tool" is marked, this is an activity that the tool has to perform; it cannot be performed by a user. For example, while a user initiates the save command, the tool performs the actual save activity (writing data to a database). Gray

rows show use cases that will not be implemented in the prototype. The administrator role will not be implemented in the prototype, so it is also grayed out.

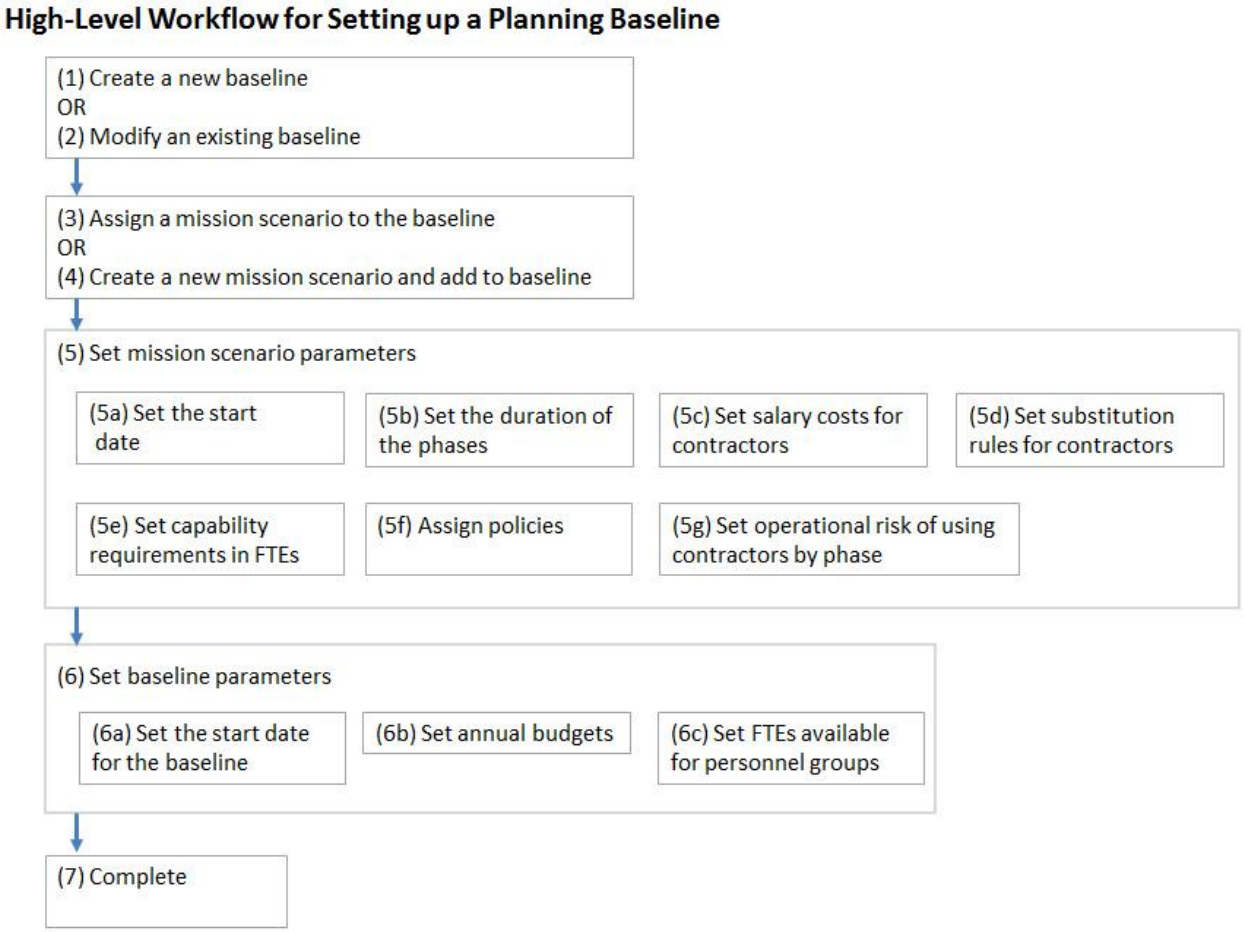

Figure 1. Workflow for Setting up a Planning Baseline.

Table 1. Use Cases for Setting up a Planning Baseline.

			Who will perform the use case			
	Planning Baseline Use Cases	**Include in Prototype?**	**Tool**	**Analyst**	**Planning Manager**	**Administrator**
1	Assign a title	x			x	x
2	Assign a description	x			x	x
3	Create a new baseline	x			x	x
4	Modify an existing baseline	x			x	x
5	Save changes to a baseline	x	x			
6	Add mission scenarios	x			x	x
7	Create mission scenarios	x			x	x
8	Set the default priority of a mission scenario				x	x
9	Set the default annual budgets	x			x	x
10	Set the default start date for the baseline	x			x	x
11	Set the default duration in years for the baseline				x	x
12	Set the default FTEs available by capability, by personnel group	x			x	x
13	Set default manpower business rules	x				x
14	Set default annual costs for military	x				x
15	Set default annual costs for DoD civilians	x				x
16	Set default annual costs for U.S. contractors	x				x
17	Set default efficiency/substitution rules for military	x				x
18	Set default efficiency/substitution rules for DoD civilians	x				x
19	Set default efficiency/substitution rules for U.S. contractors	x				x
20	Make the baseline public (available to Analysts)	x			x	x

Table 2. Use Cases for Setting Up a Mission Scenario.

			Who will perform the use case			
	Mission Scenario Use Cases	**Include in Prototype?**	**Tool**	**Analyst**	**Planning Manager**	**Administrator**
1	Assign a title	x			x	x
2	Assign a description	x			x	x
3	Assign bases	x	x			
4	Assign FTE requirements by capability to each base	x	x			
5	Assign additional support needs to each base	x			x	x
6	Set default annual costs for Local National contractors	x			x	x
7	Set default annual costs for Third-Country National contractors	x			x	x
8	Set default efficiency/substitution rules for Local National contractors	x			x	x
9	Set default efficiency/substitution rules for Third-Country National contractors	x			x	x
10	Set default hiring costs for U.S. contractors	x			x	x
11	Set default hiring costs for Third-Country National contractors				x	x
12	Set default holding costs for U.S. contractors	x			x	x
13	Set default holding costs for Third-Country National contractors				x	x
14	Set default termination costs for U.S. contractors	x			x	x
15	Set default termination costs for Third-Country National contractors				x	x
16	Set default lead time for U.S. contractors	x			x	x
17	Set default lead time for Third-Country National contractors				x	x
18	Set default start date	x			x	x
19	Set default phase durations	x			x	x
20	Assign policies to each base	x			x	x
21	Assign operational risk of using contractors to each base for each phase	x			x	x
22	Set default level of hostilities for each base				x	x
23	Make the mission scenario public (available to Analysts)	x			x	x
24	Save changes	x	x			

2.3.2. Workflow and Use Cases for Setting up a Model Run

Figure 2 shows the high-level workflow for setting up a model run. A model run is a single "what-if" analysis. A user selects a planning baseline and picks mission scenarios from that baseline to include in the model run. Mission scenario parameters can be modified during the analysis. Table 3 shows the use cases for setting up a model run. Note that only the analyst role is involved with the use cases in Table 3. Creating model runs (i.e. analysis) is the domain of the analyst. There are three types of model runs from which the analyst can choose (use case 6).

1. Normal – Deterministic model run that uses no uncertainty.
2. Strategic Hiring – In the real world, when hiring a contractor you must be concerned with lead times, hiring costs, holding costs, and termination costs. In a normal model run, contractors are only paid for the time worked. A strategic hiring run allows for this more realistic and complex implementation of hiring (use cases 12-19). In this version of the planning tool prototype, strategic hiring is only applied to U.S. Contractors.
3. Uncertainty of Phase 3 & 4 Durations – The model is also capable of assessing how uncertainty impacts contingency contractor decisions. This is important because most analysis uses predetermined profiles and start dates for each mission scenario. In reality, the exact requirements for executing mission scenarios are uncertain. In this version of the planning tool, the user is able specify a range of possible durations for phases 3 and 4 of each mission scenario (use case 22).

Table 4 shows the use cases for modifying parameters of the optimization model. The model parameters affect how the model runs and performs the optimization. Since changing the optimization model parameters can have unintended consequences, these use cases are restricted to the administrator.

Table 5 shows the use cases for interacting with the model results. There are two main categories of model results: cost and workforce allocation. Each of these graphs represents multiple data elements: scenario, personnel group, and capability. Creating graphs to represent every data combination would be too numerous. Instead, users will be able to filter the graphs on these data elements. While the user will select which elements to display, the planning tool must render the graphs appropriately. Thus, the tool must perform all of these tasks.

In both tables, the "Include in Prototype?" column shows whether or not the use case will be included in the planning tool prototype. The last four columns, under "Who will perform the use case", show which user roles will perform each use case. If "Tool" is marked, this is an activity that the tool has to perform; it cannot be performed by a user. For example, while a user initiates the save command, the tool performs the actual save activity (writing data to a database). Gray rows show use cases that will not be implemented in the prototype. The administrator role will not be implemented in the prototype, so it is also grayed out. The prototype can run model runs (use cases 28 and 29). However, at the customer's request, this feature is not included in the delivered version and, therefore, those use cases are shown in a light gray.

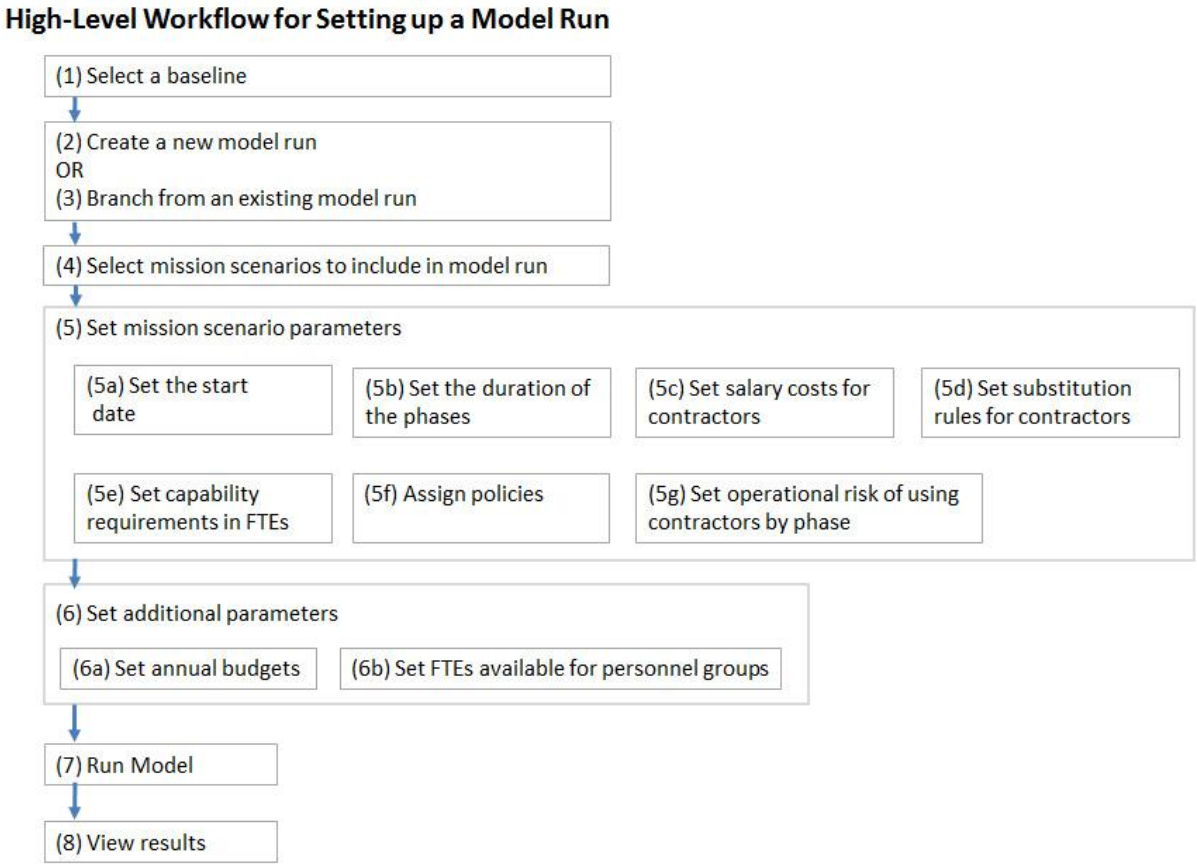

Figure 2. Workflow for Setting up a Model Run.

Table 3. Use Cases for Creating a Model Run.

			Who will perform the use case			
	Model Run Use Cases	**Include in Prototype?**	**Tool**	**Analyst**	**Planning Manager**	**Administrator**
1	Create a new model run	x		x		
2	Branch from an existing model run	x		x		
3	View existing model run results	x		x		
4	Assign a title	x		x		
5	Assign a description	x		x		
6	Select model run type	x		x		
7	Select mission scenarios to include	x		x		
8	Assign annual costs for Local National contractors	x		x		
9	Assign annual costs for Third-Country National contractors	x		x		
10	Assign efficiency/substitution rules for Local National contractors	x		x		
11	Assign efficiency/substitution rules for Third-Country National contractors	x		x		
12	Assign hiring costs for U.S. contractors (strategic hiring run)	x		x		
13	Assign hiring costs for Third-Country National contractors (strategic hiring run)			x		
14	Assign holding costs for U.S. contractors (strategic hiring run)	x		x		
15	Assign holding costs for Third-Country National contractors (strategic hiring run)			x		
16	Assign termination costs for U.S. contractors (strategic hiring run)	x		x		
17	Assign termination costs for Third-Country National contractors (strategic hiring run)			x		
18	Assign lead time for U.S. contractors (strategic hiring run)	x		x		
19	Assign lead time for Third-Country National contractors (strategic hiring run)			x		
20	Assign start date	x		x		
21	Assign phase durations	x		x		
22	Assign phase duration range for phases 3 and 4 (uncertainty run)	x		x		
23	Assign policies to each base	x		x		
24	Assign operational risk of using contractors to each base for each phase	x		x		
25	Assign level of hostilities for each base			x		
26	Save changes	x	x			
27	Run model		x			
28	Run Model with uncertainty		x			
29	View results	x		x		

Table 4. Use Cases for Modifying the Optimization Model Parameters.

			Who will perform the use case			
	Model Parameters Use Cases	**Include in Prototype?**	**Tool**	**Analyst**	**Planning Manager**	**Administrator**
1	Assign budget value for no budget constraints condition					x
2	Assign value for conversion to acquire someone in per period units available					x
3	Assign the overuse penalty					x
4	Save changes		x			

Table 5. Use Cases for Displaying Model Results.

	Model Results Use Cases	**Include in Prototype?**	**Tool**	**Analyst**	**Planning Manager**	**Administrator**
1	Show total optimized manpower mix	x	x			
2	Show total budget costs by year	x	x			
3	Show costs broken down by personnel group (monthly)	x	x			
4	Show optimized manpower mix by month	x	x			
5	Show manpower mix for a single capability	x	x			
6	Show capability needed versus availability	x	x			
7	Show results of uncertainty runs	x	x			
8	Filter by capability	x	x			
9	Filter by personnel group	x	x			
10	Filter by scenario	x	x			
11	Compare results of two model runs (same baseline)	x	x			
12	Show data table with each graph		x			

2.4. Model Results

The analyst will select one or more mission scenarios to analyze. The analyst should be able to customize the analysis by modifying the parameters listed in section 2.1.3. Analysis Data. The model optimizes the workforce mix by minimizing the combined total costs for the selected mission scenarios. The workforce mix is further limited by which personnel groups can be used based on policies, manpower business rules, and how many people are available.

In addition to workforce mix, questions and concerns that analysts would like to be able to answer are:

- What is the impact of overlapping missions (no overlap, some overlap, considerable overlap)?
- What is the impact of changes in resource available due to:
    - Changes in policy?
    - Changes to force caps on the active and reserve military?
    - Changes in FTE availability of DoD civilians?
- What is the impact of limitations on the use of contractors due to:
    - Changes in policy?
    - Operational risk of using contractors?
    - Budget constraints?

The project team selected graphs that would help analysts to determine answers to the above questions. Tacitly, the analyst is concerned about how the above situations impact total costs and workforce allocations. Therefore, model results and graphs fall into two major categories: cost and workforce allocations.

2.4.1. Cost

With declining budgets and concerns about overspending on contractors, understanding and estimating the cost of future operations is an important aspect of strategic planning. To aid analysts in understanding where money is needed, cost data is presented in two different ways.

Budget Summary
At the summary level, the analyst requires the total costs. The Budget Summary graph (Figure 3) shows the optimized, total manpower cost (sum of all mission scenarios) by fiscal year. The analyst can run the model multiple times to see how changes in the parameters impact total cost.

At a more detailed level, the analyst requires a view of how much money is being spent for each personnel group. The Budget Summary graph also shows what portion of the total annual cost has been spent on each personnel group. This allows the analyst to see estimates of total contractor costs by fiscal year.

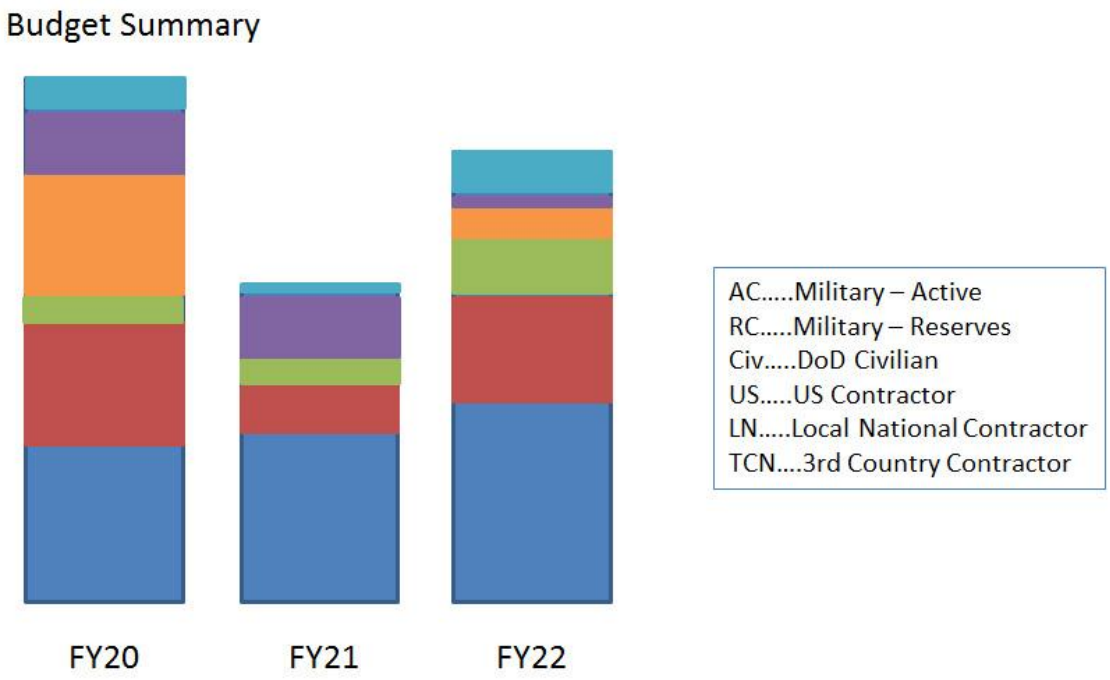

Figure 3. Example of the Budget Summary Graph.

Model Run Comparison

This view allows the analyst to compare the cost of two model runs. A table (Figure 4) displays the estimated total cost for each personnel group for both model runs. It then shows the difference in cost between the two model runs for each personnel cost. This makes it easier for an analyst to understand cost differences between model runs. It also quantifies how changes to the parameters (change in policy, mission overlap, contractor allowability, etc.) impact the total cost.

Comparison of Use Costs in Thousands of Dollars

Resource Pool	Model Run 7	Model Run 8	Difference
Active	$53	$68	$15
Reserves	$72	$100	$28
Civilians	$68	$75	$7
US Contractors	$183	$50	$-133
3rd Country	$45	$45	$0
Local	$24	$24	$0
Total	**$445**	**$362**	**$-83**

Figure 4. Example of the Cost Comparison Table.

2.4.2. Workforce Allocation

In addition to cost data, the analyst needs to know the number and type of people that are required to support the mission scenarios. The analyst must develop estimates of the number of contractors needed and when and how long they will be needed. These estimates are required for Annex W. The following graphs were designed to aid the development of these estimates.

Manpower Mix
While the TPFDD-like input and logistic support information provides an estimate of the total number of people by capability needed to support a single mission scenario, the analyst needs to determine the optimal workforce mix for all selected scenarios. This pie chart (Figure 5) displays the optimized workforce mix aggregated over all time periods.

At a more detailed level, the analyst needs to look at the manpower mix for a single capability. This is most useful for capability areas that heavily rely on contractors, such as logistics. By default, all scenarios and all capabilities (Joint Capability Areas (JCA)) are shown. This graph can be limited to a specific scenario or capability by using the dropdown menus. This allows the analyst to view the workforce mix for a single JCA.

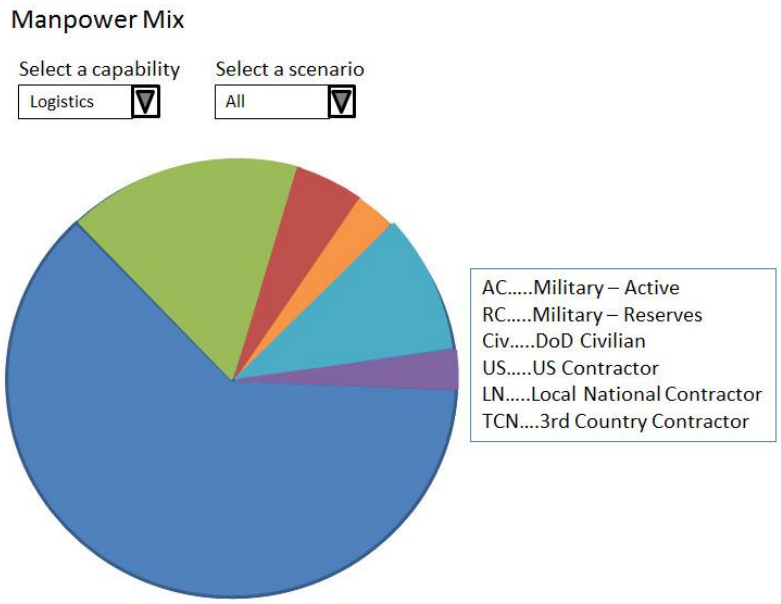

Figure 5. Example of the Manpower Mix Pie Chart.

Assignments
For a selected capability (JCA) and personnel group, the analyst needs to understand situations where the number of people needed exceeds the number of people available. In these cases of overages (more people are needed than are available), the analyst needs to see in which months there will be a shortage in personnel for the selected capability. For example, the analyst can see when the need for military logistics personnel would exceed the number available.

This graph (Figure 6) displays need for a capability versus availability.

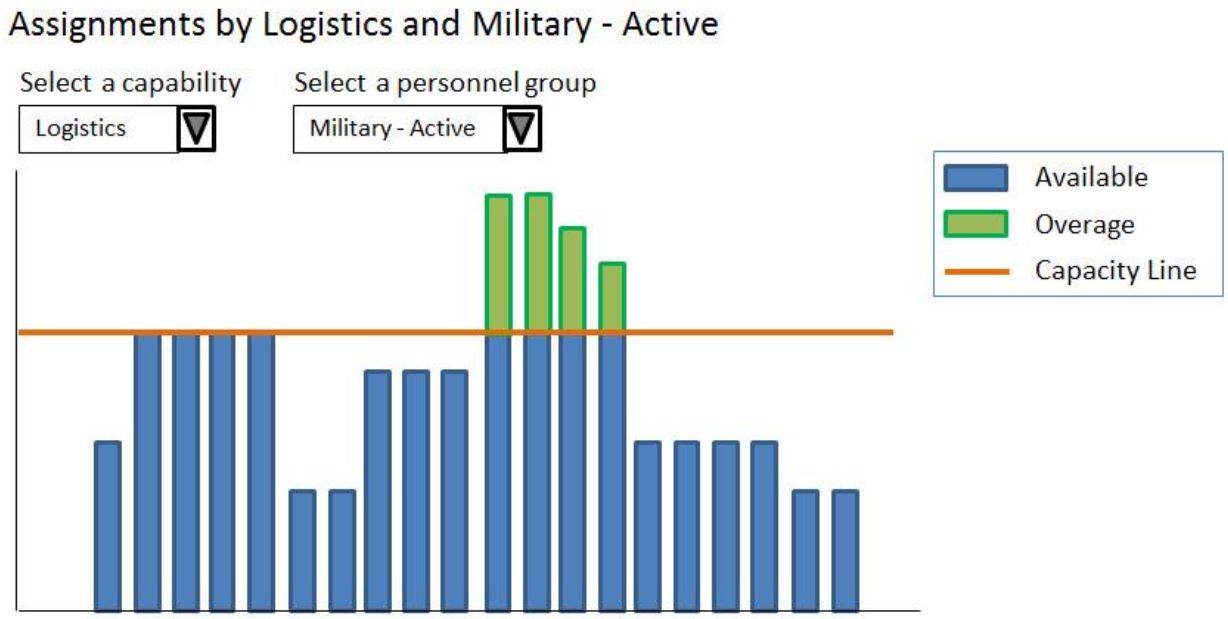

Figure 6. Example of the Assignments Graph.

Need is displayed as the number of people (from a specific personnel group) assigned to perform a specific capability. The personnel group and capability (JCA) must be selected from the dropdown menus.

Availability is shown as a capacity line – the maximum number of personnel available with that capability. The capacity line value is a parameter modifiable by the analyst on manpower availability and phase duration model run input screens. The analyst can modify the number of personnel available for all capabilities and all personnel groups. This is useful if the analyst wants to run a "what if" scenario where military size is reduced. Contractors do not have a capacity line (maximum availability) since they are assumed to be an unlimited resource.

Assignments by Personnel Group

This graph (Figure 7) displays how the need for a specific capability (JCA) has been distributed across the personnel groups. This graph is different from the Manpower Mix graph because it shows assignments for every month instead of an aggregated total. A specific capability may be selected from the dropdown menu. By default, all scenarios and all capabilities are shown. This graph can be limited to a specific scenario using the dropdown menu.

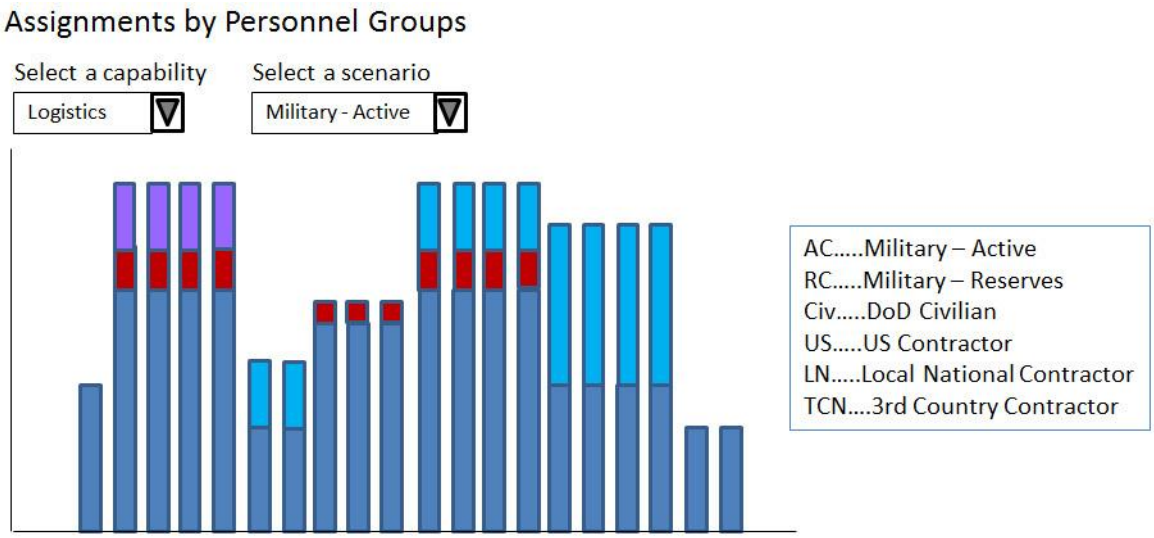

Figure 7. Example of the Assignments by Personnel Group Graph.

Assignments by Capability

This graph displays how a specific personnel group has been assigned across the capabilities (Joint Capability Areas). It shows the capability assignments for every month. The personnel group may be selected from the dropdown menu.

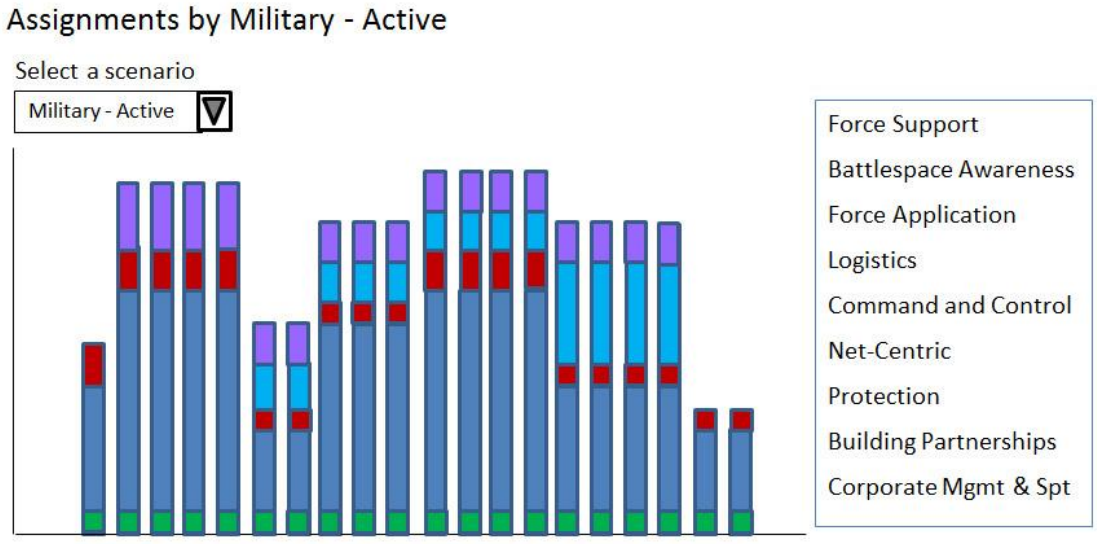

Figure 8. Example of the Assignments by Capability Graph.

Assignments by Scenario
This graph is similar to the Assignments graph but without the capacity line. The Assignments graph also shows capability by personnel group aggregated for all mission scenarios. This graph shows capability by personnel group broken down by mission scenario.

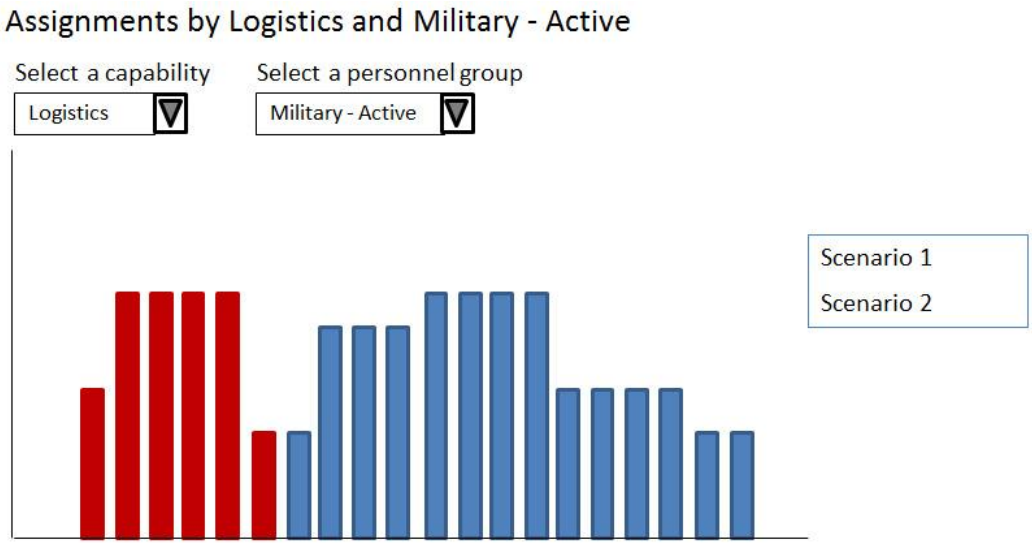

Figure 9. Example of the Assignments by Scenario Graph.

Model Run Comparison
In addition to comparing the cost of two model runs, this graph also allows the analyst to compare the manpower mix of those two model runs. The manpower mix pie charts are shown side-by-side. It quantifies how changes to the parameters (change in policy, mission overlap, contractor allowability, etc.) impact the optimal manpower mix. The graphs can further be filtered by capability and by mission scenario.

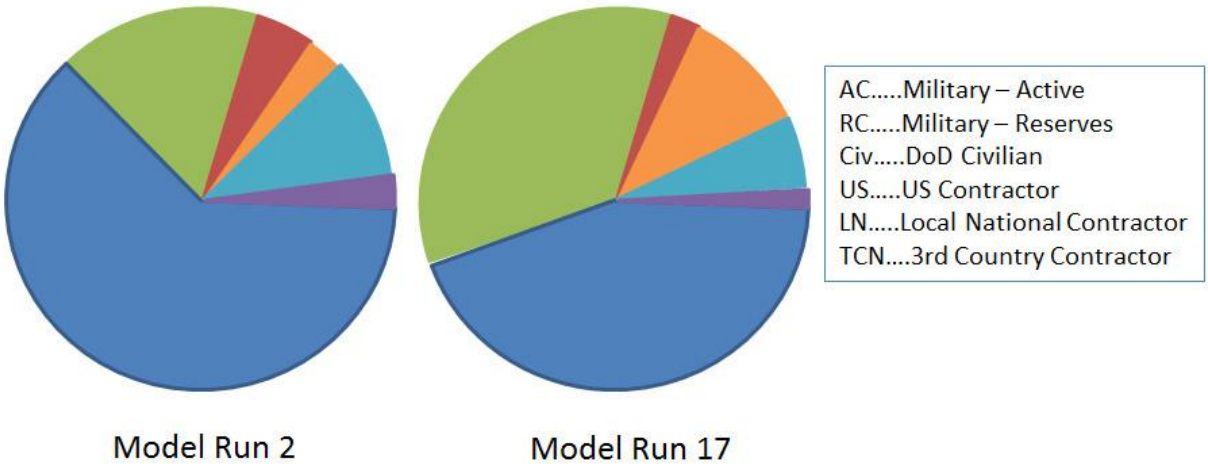

Figure 10. Example of the Manpower Mix Comparison Pie Charts.

3. PLANNING MANAGER WORKFLOWS

The planning manager is in charge of creating new planning baselines and adding and creating the relevant mission scenarios. Figure 11 shows the overview of this process. The planning manager is expected to have enough knowledge about the mission scenarios to be able to set reasonable default values. Planners at the COCOM or service level, who are very familiar with the mission scenarios, are good candidates for planning manager. More than one person can be a planning manager.

Planning Baseline - A planning baseline is a group of mission scenarios that analysts must consider in their planning. The analyst is a planner who will be using the planning tool to perform "what-if" analyses. A planning baseline can be in draft mode (not viewable by analysts) or public mode (viewable by analysts). The mode also affects which baseline parameters are modifiable by the planning manager. Figure 12 shows the differences in draft and public modes.

Preset Baseline Values–The preset baseline values are values that should remain constant across all planning baselines and mission scenarios. It is important to review these values before creating a new planning baseline. They can only be modified by the administrator.

Mission Scenarios - A mission scenario represents a single mission, ranging from disaster relief and humanitarian assistance to a major combat operation. The mission scenario in the tool is focused on the capability requirements by phase needed to implement the mission. Using the capability requirements, policies, and risk settings, the planning tool will calculate an optimized workforce mix to support the mission. The planning manager can create a new mission scenario or reuse existing ones. Certain parameters can only be set when creating a new mission scenario. Figure 13 shows the differences in creating a new scenario and using an existing scenario.

Operation Types - Operation types allow you to set up default settings for Level of Risk of Using Contractors based on the type of operation. The goal is to help expedite reviewing and filling out default values for a mission scenario. Settings for contractor risk can be modified within a mission scenario.

The related storyboards can be found in the *Contingency Contractor Optimization Phase 2, Storyboards for Planning Manager* [5] document.

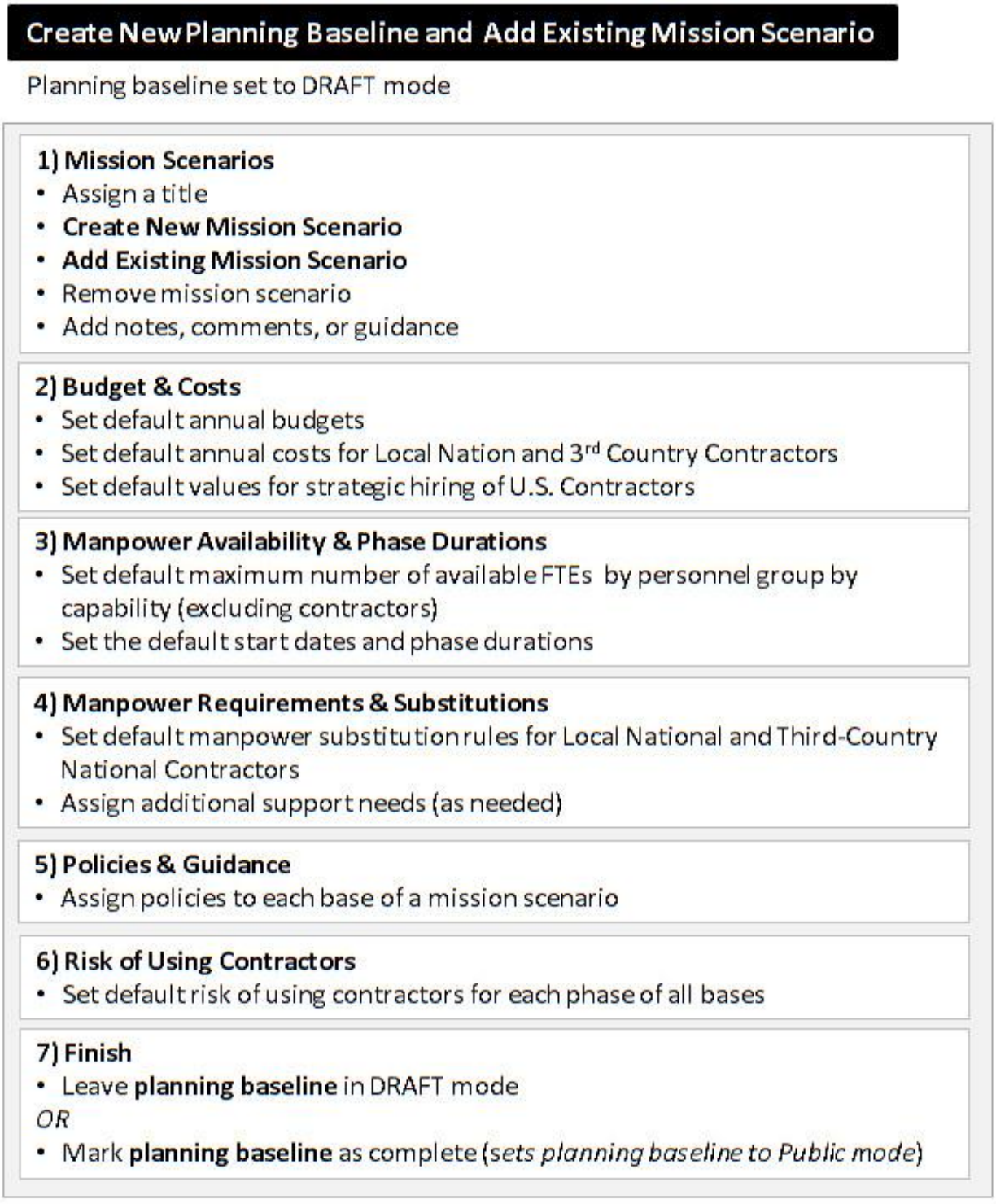

Figure 11. Overview of Creating New Planning Baseline and Adding an Existing Mission Scenario.

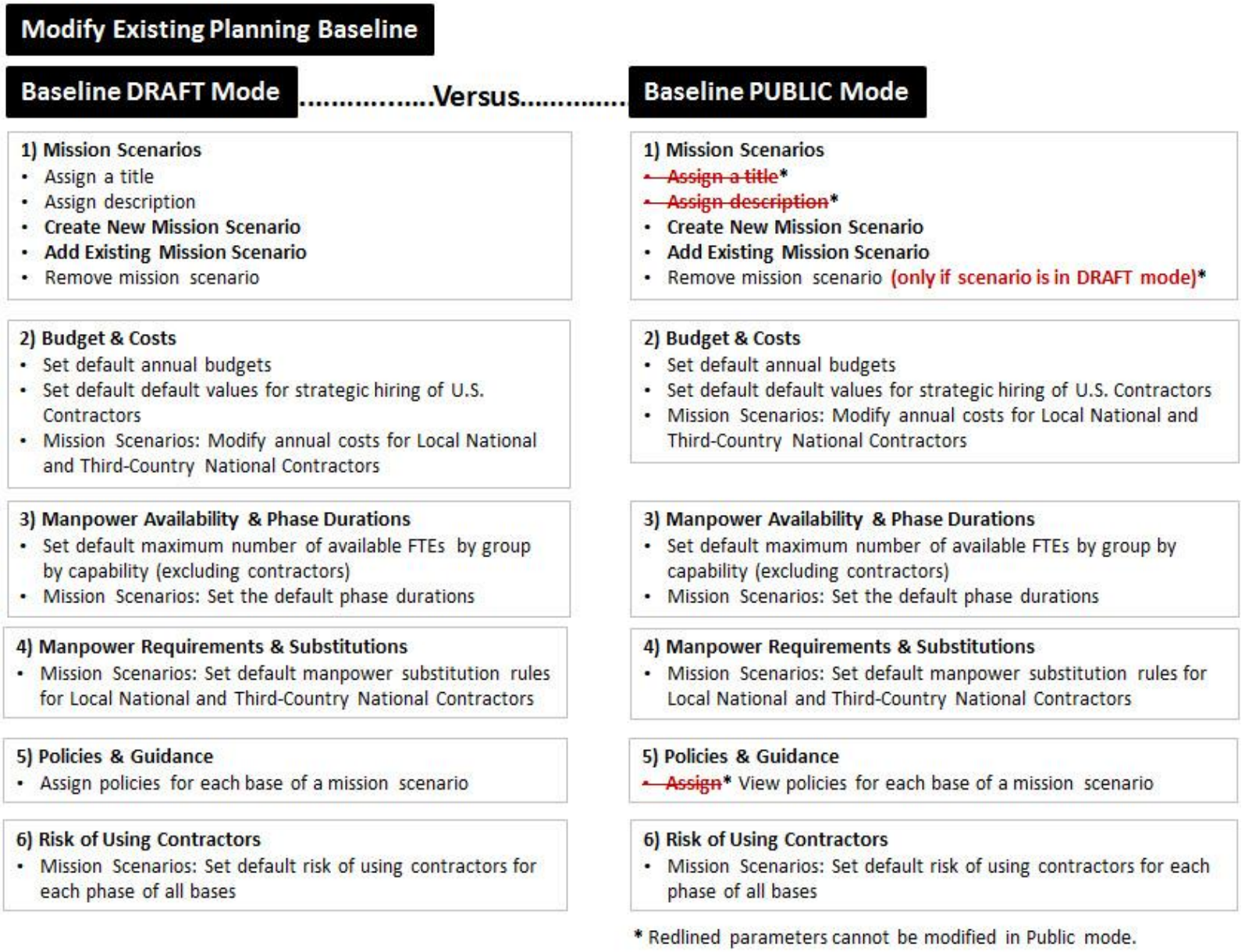

Figure 12. Differences between Draft and Public Modes for Planning Baselines.

Figure 13. Differences in Creating a New Mission Scenario and Adding an Existing Mission Scenario.

4. ANALYST WORKFLOWS

The analyst is a planner who will be using the planning tool to perform "what-if" analyses. A model run is a single "what-if" analysis. Figure 14 gives an overview of creating and branching a model run. Through these analyses, the analyst will be able to provide estimates on the number of contractors needed, what capabilities they will need to have, and when they will be needed in theater. Figure 15 gives an overview of viewing results from a model run.

There are two types of planning that can be performed. First, the analyst can perform planning limited to scenarios within a COCOM or service. Second, the analyst can perform an integrated, centralized analysis using scenarios across all COCOMs and all services.

The related storyboards can be found in the *Contingency Contractor Optimization Phase 2, Storyboards for Analyst Activities* [6] document.

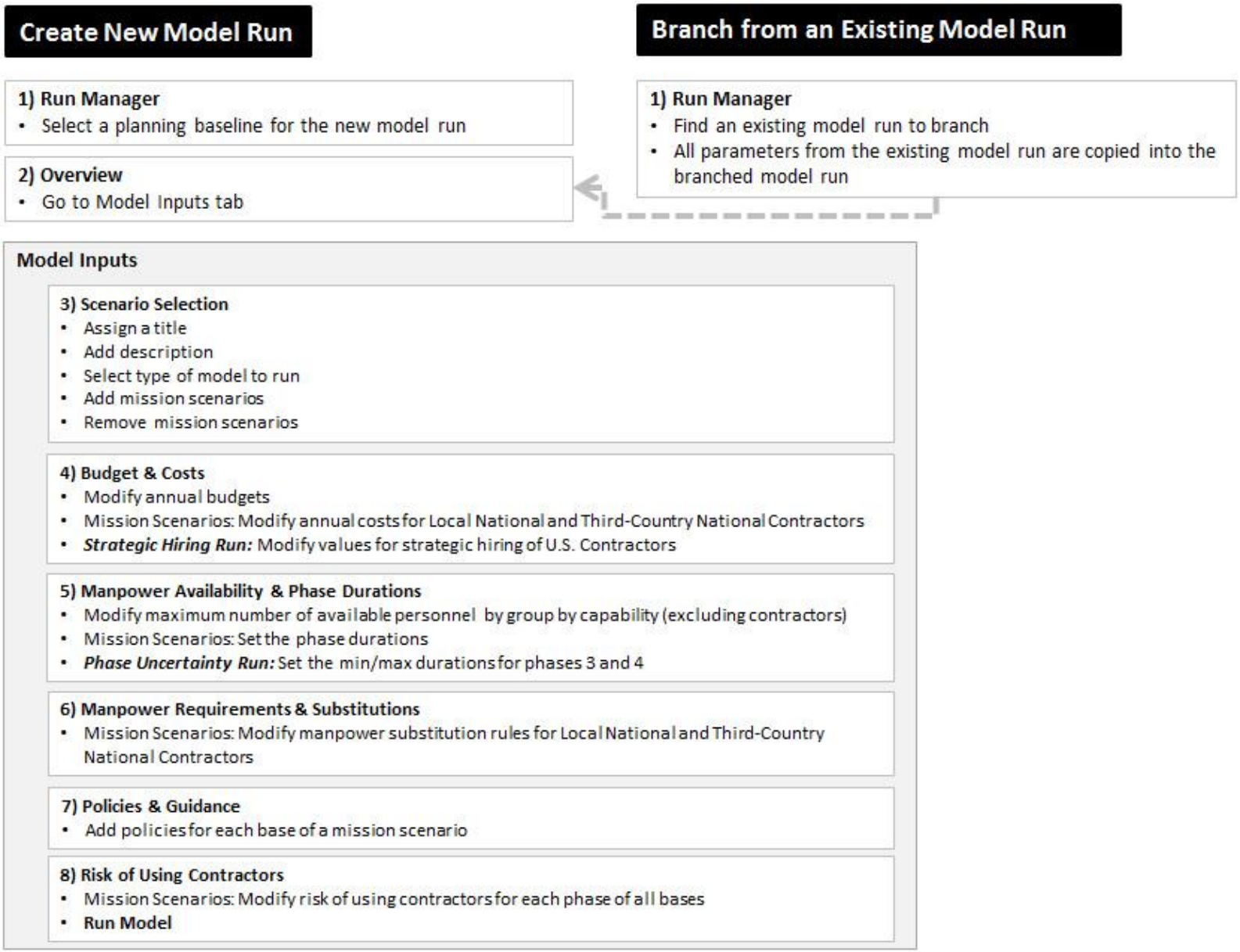

Figure 14. Overview of Creating and Branching Model Runs.

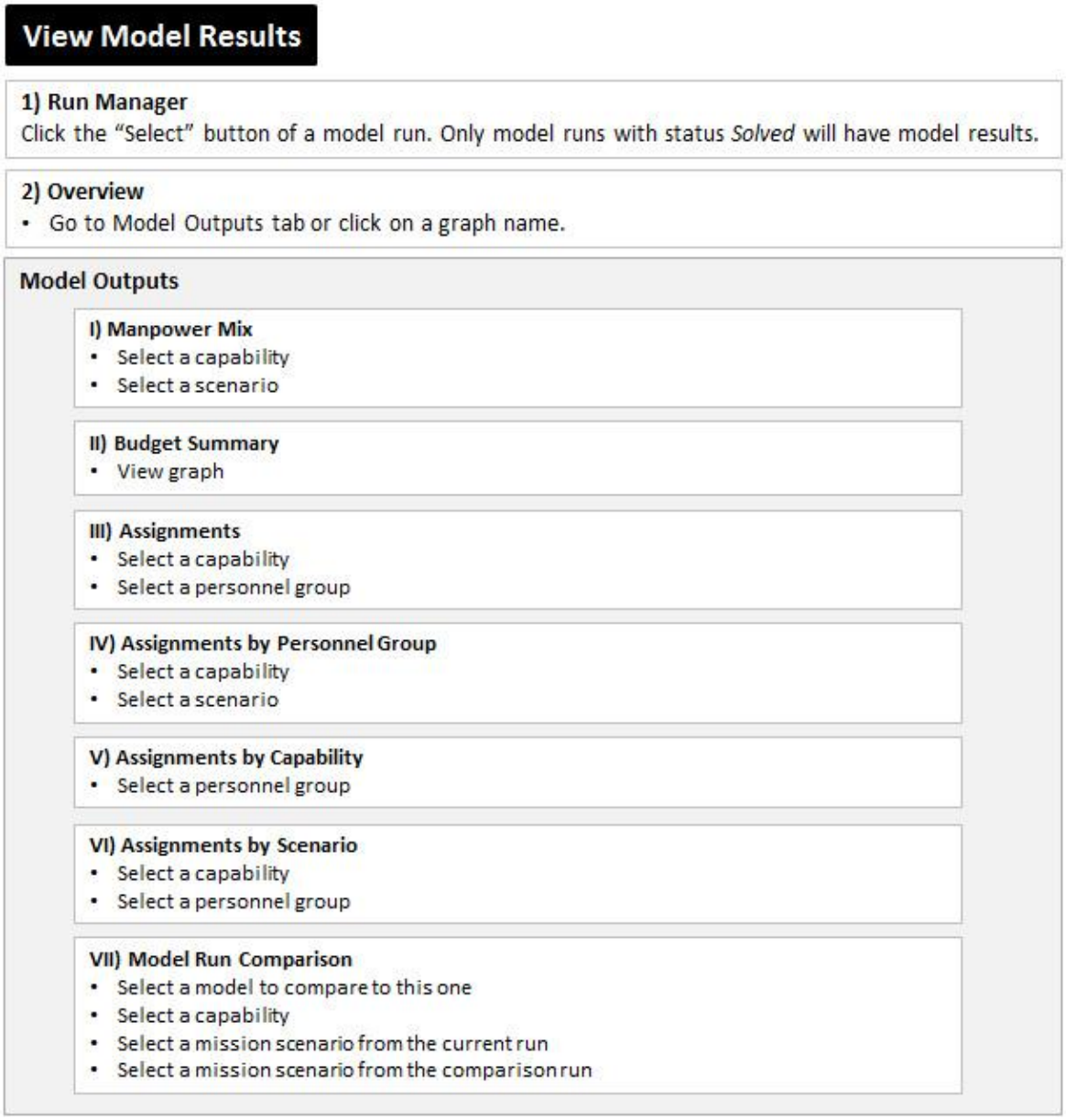

Figure 15. Overview of Viewing Results from a Model Run.

5. ADMINISTRATOR WORKFLOWS

The administrator sets high-level parameters that are constant across all analyses. These are high-level, static parameters that should not change with every new planning baseline. The administrator also helps to maintain the planning tool and to manage user access to the planning tool.

The administrator can access all of the same screens as the planning manager. Access that is limited to only the administrator is listed in this section.

The related storyboards can be found in the *Contingency Contractor Optimization Phase 2, Storyboards for Administrator Activities* [7] document.

Model Manager- Model manager includes parameters that affect how the model optimizes the manpower mix. Since changing the optimization model parameters can have unintended consequences, these use cases are restricted to the administrator. Figure 16 shows the model manager parameters.

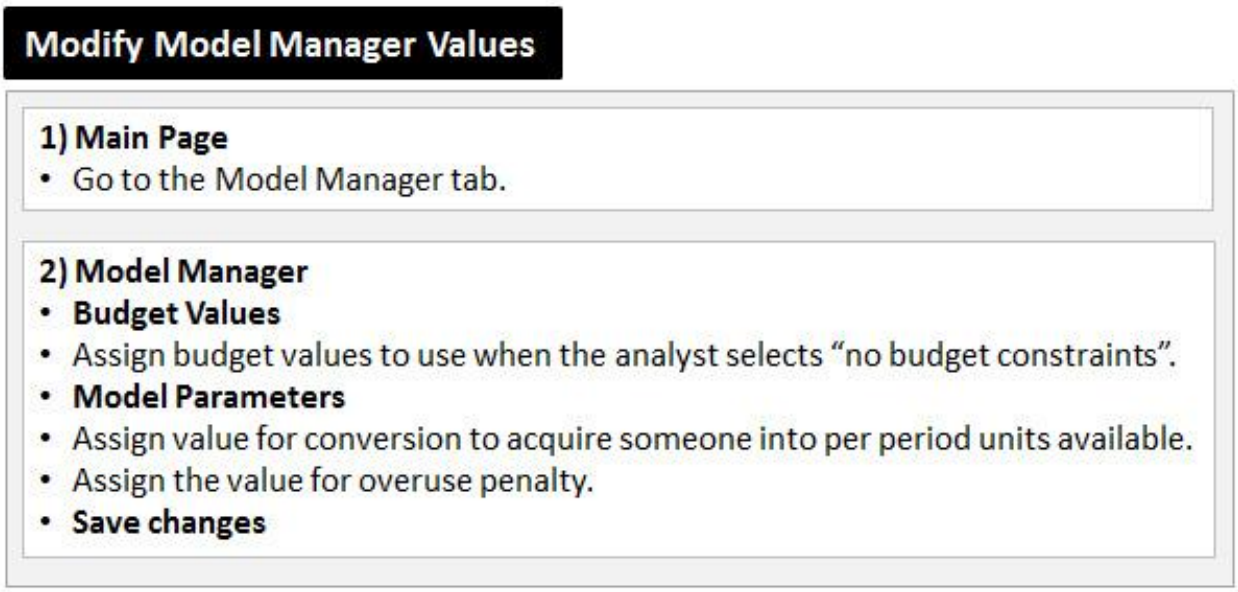

Figure 16. Overview of Modifying the Model Manager Page.

Preset Baseline Values–The preset baseline values are values that should remain constant across all planning baselines and mission scenarios. They can only be modified by the Administrator. Figure 17 gives an overview of modifying the preset baseline values.

Figure 17. Overview of Modifying the Preset Baseline Values Page.

6. FUTURE DEVELOPMENT

In Phase 2 of the Contingency Contractor Optimization project, the needs and requirements analysis conducted in Phase 1 of the effort were utilized, coupled with additional interviews with Subject Matter Experts, to further refine the requirements for an OCS strategic planning tool. Using these requirements, Sandia developed the electronic story board-type prototype Strategic Contractor Planning Tool that can be used for communication with senior decision makers and other OCS stakeholders. Development of the planning tool will continue in future phases of the project.

Phase 3 will be focused on developing production-level software for OCS strategic planning. Sandia plans to work with the OCS strategic planning community to identify the eventual end users and to get feedback and inputs to ensure usefulness as an enduring OCS strategy planning capability for OSD and the COCOMs. In addition to making the changes necessary to create a production version of the tool, some additional features are planned that will enhance the tool's capabilities. These features include changes to the use roles, the inclusion of new uncertainty features, a more complete implementation of strategic hiring, and improved data displays.

Currently, the planning tool prototype only includes the planning manager and analyst roles. The administrator role has not yet been included. This role will be implemented in the next version of the tool. The administrator role is a minor one, but will help with maintaining consistency across all analyses by controlling high-level parameters within the planning tool. Only the administrator will be able to access these parameters. The administrator will also help maintain the planning tool and manage user access to the planning tool.

Additional uncertainty features and a more complete implementation of strategic hiring will also be added. The model is capable of handling any type of mission scenario uncertainty, but the planning tool's interface limits which uncertainty features an analyst can access. The current interface only allows the analyst to run a model with uncertainty around the durations for phases 3 and 4. Strategic hiring is a concept within the model that allows specific resources to be hired in anticipation of future demand. It is used to mitigate the risk of not having specific resources available when needed. The strategic hiring included in the planning tool prototype does not include risk mitigation or risk mitigation under uncertainty (Contingency Contractor Optimization Phase 2, Model Description and Formulation).

Model results for uncertainty runs currently show expected values for the stochastic results. While having the minimum, median, and maximum information would be beneficial and give analysts a better understanding of the range of uncertainty in the results, the graphs are visually difficult to decipher (Contingency Contractor Optimization Phase 2, User Manual – Strategic Contractor Planning Tool Prototype). This information is much easier to interpret in a data table format. Data tables will be added below all uncertainty graphs in future versions of the tool.

REFERENCES

[1] *Secretary of Defense Memorandum, Strategic and operational planning for operation contract support (OCS) and Workforce Mix,* 2011.

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[3] K. A. Jones et. al., "Contingency Contractor Optimization: Phase 2, Tool Requirements Document," Albuquerque, 2012.

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[5] Sandia National Laboratories, *Contingency Contractor Optimization Phase 2, Storyboards for Planning Manager Activities,* Albuquerque, 2012.

[6] Sandia National Laboratories, *Contingency Contractor Optimization Phase 2, Storyboards for Analyst Activities,* Albuquerque, 2012.

[7] Sandia National Laboratories, *Contingency Contractor Optimization Phase 2, Storyboards for Administrator Activities,* Albuquerque, 2012.

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