

Enterprise Optimization Solutions, Inc.

WOSB/VOSB/SDB

White Paper

Presenting

**Performance and Budget
Optimization 180[©]
(PBO 180)**

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Enterprise Optimization Solutions, Inc.

Woman-Owned Small Business (WOSB)
Veteran-Owned Small Business (VOSB)
Small Disadvantaged Business (SDB)

An emerging small business.

Executive Summary

Enterprise Optimization Solutions, Inc. is pleased to introduce PBO 180, a revolutionary, one-of-a-kind, project management, support, planning, risk analysis, and budget/schedule optimization and decision support tool. PBO 180's integrated functionality further provides a means to establish an optimized baseline from which ANSI/EIA-748 compliant Earned Value Management (EVM) can be conducted and reported. This unique product has no competition in the commercial or Federal markets.

EOS has streamlined, optimized, and integrated all aspects of project planning, execution, monitoring, and EVM. PBO 180 is a powerful, user-friendly, web-based suite of project management tools enabling project managers to easily conduct complex budget and schedule modeling, optimization, simulation, and analysis. Managers can maximize the effectiveness of their projects based upon both time and cost constraints. PBO 180 is an accurate mechanism for assessing projections of programmatic variations, providing program accountability of resources with the highest level of data integrity. PBO 180 utilizes cutting-edge technology, to optimize your budget and your schedule.

The completeness and efficiency of PBO 180 provides tremendous time and cost savings both in planning and executing a program as well as identifying optimized planning solutions to ensure that you get the most performance, highest expected outcome for the dollars and resources applied.

PBO 180 quickly provides decision makers the ability to achieve optimum outcomes/performance at the lowest cost with known and measurable risks.

1. Introduction

Purpose. This white paper details the capabilities and features of PBO 180, targeted to resolve the challenges of applying and managing resources optimally with high visibility and accountability. PBO 180 is a cutting edge multi-objective optimization tool that covers the entire lifecycle of a project. Through a logical integration of functions, projects will be optimized, changes managed, risks mitigated and performance metrics quantified.

In the planning phase, expected outcomes/performance metrics, budget line items, and schedule are fused to develop a project plan that maximizes projected effectiveness while providing assessments of the:

- Probability of timely and successful project execution
- Risk identification and impacts
- Fiscal accountability
- Monte Carlo schedule simulation
- Rational decision/knowledge management information

In the execution phase, PBO 180 facilitates monitoring of task progress and the actual costs incurred vis-à-vis the project baseline, automating EVM reporting in compliance with ANSI/EIA-748.

PBO 180 is a total program and agency tool set for planning, execution, monitoring, and controlling budgets, schedules and expected outcomes.

Company Introduction. Enterprise Optimization Solutions, Inc. (EOS) was founded in 1999 to provide customers with solutions to the challenges of managing projects with decreasing resources in an environment of increasing operational requirements. EOS has a solid foundation of expertise that represents out-of-the box thinking, seasoned thought processes, and forward-looking analysis.

Janice Buxbaum, founder of EOS, is a Vietnam-era veteran and United States Naval Academy graduate. She has more than 30 years experience in military programs, management of engineering and logistics programs, and business development, providing information technology, engineering, logistics, and program management support to federal, state, and local government agencies. She knows first-hand the difficulty and complexity of today's fiscal environment and has dedicated herself and her company to bridging your challenges with effective solutions.

EOS's dedicated and experienced employees enable us to consistently achieve successful technical implementations with managed risk and assured quality because of our shared commitment to exceeding client expectations.

2. Background

Enterprises, government, and commercial entities are struggling with fewer resources and higher demands. All are challenged with strengthening governance while optimizing resource allocation coupled with streamlining business processes. The elements of PBO 180 will push the outer bounds of optimization to help shape the enterprise, project or topic through algorithmic calculations targeted to bridge performance levels with resource allocation.

In the March 2009 Cost Estimating and Assessment Guide, GAO advises:

“As resources become scarce, competition for them will increase. It is imperative, therefore, that government acquisition programs deliver as promised, not only because of their value to their users but because every dollar spent on one program will mean one less available dollar to fund other efforts. To get better results, programs will need higher levels of knowledge when they start and standardized monitoring metrics such as EVM so that better estimates can be made of total program costs at completion”¹

Early Solutions & Successes. PBO 180 is a new product that was built upon proven core functionality. The predecessor performance optimization model (OPOM), was built by the same team who built PBO 180. OPOM is accredited by Johns Hopkins University Applied Physics Laboratory through the Navy, and has been in continuous use since 2004. Within the first 24 months of implementation, OPOM modeling resulted in an increase in overall operational readiness while at the same time achieving a \$200M cost benefit/savings.

Building OPOM provided us with a great deal of knowledge and even more, showed us the tremendous power of this technology. Recognizing this, EOS committed itself to building a robust application and management tool that would enable optimization and accountability for the entire program life cycle.

The Business Challenge:

- Optimize the management and allocation of finite resources
- Satisfy expanding mission performance requirements
- Solve atypical challenges amid fast-changing priorities and requirements
- Articulate impacts of budget cuts rapidly and effectively

EOS has extensively invested in developing a forward-looking and one-of-a kind product that truly and uniquely optimizes budgets and schedules. It enables Federal and commercial agencies, which currently rely on labor intensive or fragmented methods, to gain valuable knowledge of the impact on their mission of variations in budget controls, tasks, and resources. It then provides streamlined, fast, and accurate solutions sets and projections. This product changes the paradigm from using cumbersome spreadsheets to

¹ United States. General Accounting Office. GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs. Washington: GPO,2009.

deploying a robust and efficient optimization engine called *Eagle* which is the operating core of PBO 180.

PBO 180 ties together the specificity of planned activities and milestones, anticipated costs and expected mission outcomes. This application will enable you to take all tasks and associated costs and quickly optimize resources through the algorithm power of Eagle, resulting in the most efficient plan to satisfy your requirements while ensuring accountability and visibility.

PBO 180 will enable you to institute expenditure plans that include explicit and measurable commitment relative to cost, schedule, and benefit of individual program activity. As an integrated performance budget and schedule application model, PBO 180 defines the relationship between planned budget costs and expected outcomes in a measurable way, further enabling optimized modeling of costs, capabilities, and schedules to achieve the most efficient solution.

The power of PBO 180 optimization modeling lies in the transformation of enterprise or project data into credible, usable, and detailed knowledge. This knowledge will act as one of several pillars providing the organization with a decision advantage, account for resources, articulate risk, and project future impacts related to program/FYDP budget and scheduling changes. After the enterprise or project information is baselined, PBO 180 seamlessly provides ANSI/EIA-748-compliant earned value management.

3. PBO 180 Features and Capabilities

The unique capabilities of PBO 180 include:

- *Modeling the impact of budget cuts to a project.* PBO 180 will produce an optimized budget that meets budget constraints while maximizing the overall objectives of the project. Reports summarize the impact of the cuts on the project's effectiveness.
- *Determining how to best apply crash times and costs to projects that are behind schedule.* PBO 180 uses critical path analyses to determine the optimal set of tasks that should be crashed, the cost of crashing those tasks, and the impact on the schedule.
- *Assessing the probability of finishing a project in a certain amount of time.* PBO 180 uses a Monte-Carlo simulation to produce a time vs. probability curve.

PBO 180 supports the following project management processes:

- Scope Management
 - Define and use a standard WBS template for projects
 - Create custom WBSs for other projects
 - Track scope changes using history and comparison tools
- Time Management
 - Define tasks
 - Develop time estimates and schedules
 - Identify the critical path

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- Cost Management
 - Conduct cost estimation and budgeting
 - Model the impact of budget cuts on tasks/activities and project objectives
 - Baseline and track project progress and performance
 - Conduct EVM metric tracking and reporting
 - Optimally apply crash times and costs to projects and evaluate their impact
- Risk Management
 - Conduct risk analysis regarding time and cost estimates
 - Conduct Monte-Carlo simulations using optimistic and pessimistic time estimates
 - Determine probability of meeting cost and time objectives

PBO 180 is a web-based/.NET/C #, database agnostic, scalable toolset. It is the only product on the market that fully integrates all program and system variables into a single comprehensive environment. PBO-180 consists of Performance Budgeting Model (PBM), Project Management Analytics (PMA), and Earned Value Management (EVM) views and functions. The Administration functionality is a very easy user management feature. With permissions-based authentication, user access to the tools and project-specific information can be established as needed to control who sees what data. Data for one department can be easily compartmentalized from another while still providing higher-level leaders with enterprise-wide access. The Help module provides users with integrated context-sensitive help, a user guide, and provisions for help desk support.

Hardware and Software Requirements: The PBO 180 application typically resides on a standalone quad core dual processor Microsoft Windows server using Microsoft Server 2008 and SQL Server 2008. Users can access the application using Internet Explorer 7 (minimum) or Firefox 3.0; Flash is needed to view graphics in the application. If using the built-in interface to Microsoft Project, both the user and server must have Project installed (Project 2003 at a minimum - recommend Project 2007)

PBO 180 IN ACTION THROUGH THE LIFECYCLE OF A PROJECT:

PLAN AND OPTIMIZE – ANALYZE AND BASELINE – EXECUTE/MONITOR/EVM

3.1 Plan and Optimize.

Data using a work breakdown structure (WBS) in Microsoft Project that identifies tasks, schedule, and resources can be imported seamlessly into PBO 180. Any scheduling tool, commercial or custom, can be interfaced. PBO 180-specific data includes constraints such as color of money, budget dependencies, crash time and resources, pessimistic and optimistic times for scheduling parameters, and objective value. The objective value is defined as a measure of the contribution of a task to the overall mission goal. Calculating objective value for each task can be complex and cumbersome. To assist decision makers, we include an Analytical Hierarchy Process (AHP) capability which is fully automated in the administration function of the application. Task details in a PBO 180

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profile can be refined according to the organization's business rules as needed. Once the profile data and information is captured, PBM or PMA model runs can be executed.

PBM is used to assess and determine the optimal set of requirements to fund that meet constraints while maximizing the overall expected outcomes/performance of the project.

Model runs can be constrained by budget or expected outcome/performance. If the model run is constrained by budget, PBM will maximize expected outcome, ensuring that the total funding for all tasks is less than or equal to the established budget constraints. If constrained by expected outcome, PBM will work to meet the expected outcome target at the minimum cost.

The application's robust optimization engine produces solution sets depicting the impact of cost or performance variances. The results of a PBM model run show the total amount funded and the overall expected outcome for the profile. Each line item in the solution set is color coded, indicating full, partial, or unfunded tasks, and populated with funding details, including color of money parameters. Results for a partially funded or unfunded task include the impact statement for that task. The analyst can easily assess the risk and project limitations associated with resource or readiness changes.

The screenshot displays the 'PBM Run Results' interface. At the top, there are tabs for 'PBM Runs', 'Create PBM Run', and 'Compare PBM Runs'. Below this, a summary table provides key metrics:

Run Name:	tt	Profile Name:	Tucson-1
Run Type:	Constrained Run - Cost	Readiness Result:	88.97 %
Total Requirements:	\$3,744,000.00	Total Funded:	\$2,229,000.00
Years:	All	Use Dependencies:	Yes

Below the summary table is a comparison of funding requirements for 'Acquisition' and 'Sustainment':

	Acquisition	Sustainment
Required Funding	\$2,224,000.00	\$1,520,000.00
Minimum Funding	\$30,000.00	\$0.00
Available Funding	\$1,112,000.00	\$1,368,000.00
Remaining Funding	\$103,000.00	\$148,000.00

At the bottom of the screenshot, there is a table of tasks with columns for Task #/WBS, Task Name, Funding Year, Required Cost, Funded amount, Color of Money, and Properties. The tasks are listed in a hierarchical tree view on the left.

Task #/WBS	Task Name	Funding Year	Required Cost	Funded	Color of Money	Properties
Tucson-1	Tucson-1	2009	\$3,744,000.00			
0	Tucson-1	2009	\$3,744,000.00			
1	System Design & Qualification	2009	\$65,000.00			
1.1	Legacy Sensor Integration	2009	\$30,000.00			
1.2	ABM BFT Integration: Mobile Common Operating Picture	2009	\$20,000.00		Acquisition	
1.3	AMDC Video Integration	2009	\$15,000.00		Acquisition	
2	Communications Infrastructure	2009	\$194,000.00			
3	Deployment Design	2009	\$1,925,000.00			
3.1	Command & Control Facility	2009	\$625,000.00			
3.1.1	Land Survey	2009	\$15,000.00		Acquisition	
3.1.2	Site CAD Models	2010	\$10,000.00		Acquisition	
3.1.3	Construction	2010	\$600,000.00		Acquisition	
3.2	Fence Planning and Construction	2010	\$315,000.00			
3.3	Surveillance Planning and Implementation	2010	\$965,000.00			

PBM can optimize a profile as a whole, without regard to timing of funding, or on a year-by-year basis. PBM funds those tasks that maximize the overall expected outcome of the project/program at a total cost that is less than or equal to the budget constraint.

Many organizations need to produce budgets projecting years into the future. Their funding is provided on a year-by-year basis, which can vary widely. They may be budgeting for both one-time and ongoing tasks. When cuts are made in one year, some of the unfinished tasks may be added to the requirements for the following year. PBM handles this type of model run by optimizing the profile one year at a time. Depending on the settings for the task, unfunded requirements may not be executed, or may be added to the following year's requirements. The second year is then optimized using the updated requirements. Unfunded requirements are added to the third year as specified by the task settings, and so on.

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PBM Run Name:	Sfwr MY extra in yr 2	Profile Name:	Software Apps 2011-2018
Run Type:	Constrained Run - Cost	Total Requirements:	\$4,641,511.81 Year: 2011 - 2018

	Funding Year	Original Required Funding	New Required Funding	Minimum Funding	Available Funding	Total Funding	Remaining Funding	Readiness
+	2011	\$1,773,028.34	\$1,773,028.34	\$0.00	\$1,595,725.50	\$1,595,725.50	\$0.00	
+	2012	\$366,916.10	\$509,970.20	\$0.00	\$458,155.76	\$458,155.76	\$0.00	
+	2013	\$491,565.42	\$513,452.70	\$0.00	\$442,408.89	\$442,408.89	\$0.00	
+	2014	\$365,399.48	\$408,663.94	\$0.00	\$328,859.54	\$328,859.54	\$0.00	
+	2015	\$411,655.31	\$463,056.38	\$0.00	\$370,489.78	\$370,489.78	\$0.00	
+	2016	\$399,941.78	\$463,872.78	\$31,212.00	\$359,947.60	\$359,947.60	\$0.00	
+	2017	\$440,589.15	\$515,335.52	\$46,903.53	\$396,530.24	\$396,530.24	\$0.00	
+	2018	\$392,416.23	\$481,905.17	\$0.00	\$353,174.60	\$353,174.60	\$0.00	
Total		\$4,641,511.81			\$4,305,291.91	\$4,305,291.91		

- Export to MS Excel
- Export to MS Project
- Edit PBM Run
- Cost Readiness Curve

Task #/WBS	Task Name	Funding Year	Objective Weight	Color of Money	Required Costs	2011	2012	2013	2014	2015	2016	2017	2018
4.1	Financial Application Enhancements				\$432,343.65	●	●	●	●	●	●	●	●
4.1.1	Add what if capability to analytics	2011	200/200	Development	\$30,127.35	●							
4.1.10	Miscellaneous enhancements (2016)	2016	400/301	Development	\$30,000.00						⚠	●	
4.1.11	Miscellaneous enhancements (2017)	2017	400/301	Development	\$30,000.00							⚠	●
4.1.12	Miscellaneous enhancements (2018)	2018	400/301	Development	\$30,000.00								●
4.1.2	Allow user limited ability to change assumptions	2017	600/200	Development	\$39,641.25							⚠	●
4.1.3	Automate financial reports	2013	500/501	Development	\$23,784.75		●						
4.1.4	Link financial application to inventory files	2016	600/401	Development	\$45,983.85						⚠	●	
4.1.5	Miscellaneous enhancements (2011)	2011	600/201	Development	\$42,812.55	●							
4.1.6	Miscellaneous enhancements (2012)	2012	800/201	Development	\$43,668.80		●						
4.1.7	Miscellaneous enhancements (2013)	2013	800/201	Development	\$56,325.10			●					
4.1.8	Miscellaneous enhancements (2014)	2014	400/301	Development	\$30,000.00				⚠	⚠		●	
4.1.9	Miscellaneous enhancements (2015)	2015	400/301	Development	\$30,000.00						⚠	●	

PMA is used to model and analyze the schedule for projects or tasks.. PMA combines Program Evaluation Review Technique (PERT) with the Critical Path Method (CPM) to provide scheduling optimization. Monte Carlo simulation is added for probabilistic estimating. PMA outputs enable a user to discover ways to reduce project duration while minimizing cost, and to estimate or improve the probability of successful project completion within a stated time constraint.

To conduct time-cost tradeoff analyses a target time or cost can be entered, and the model will provide an optimized solution that uses the critical path and crash times and costs to determine the resulting time and cost and probability of success. A time-cost curve is generated using the crash data across the entire range of times and costs projected.

Monte-Carlo simulations of the probability of successfully completing the schedule in a specific amount of time are presented as a time vs. probability curve.



3.2 Analyze and Baseline.

The output of the model runs answering the “what if” scenarios can be analyzed for an acceptable budget/risk/readiness/schedule solution. The analyst will know the exact impacts on performance/expected outcomes based on budgetary changes. Once a plan is approved, a push of a button base-lines it and enforces all the associated business rules and version configuration control mechanisms

Baseline Details - Tucson-1_B1

Baseline Profiles

Baseline Details | Baseline History | Baseline Information | EVM Reports | Cost Over Time | Gantt View

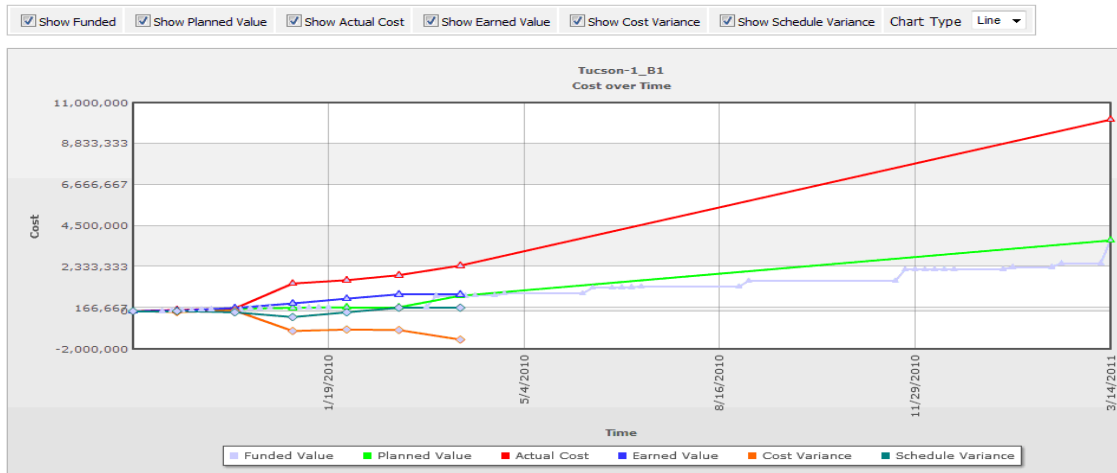
Check In | Replan Baseline | Copy Profile For Adjusted Baseline | Export to MS Project

Table Data View: Earned Value Method | Check out by: dhsuser

Task #/WBS	Task Name	Control Account	Earned Value Method	Planned Spending Distribution	Start	Finish
Tucson-1_B1	Tucson-1_B1				10/6/2009	3/14/2011
0	Tucson-1				10/6/2009	3/14/2011
1	System Design & Qualification	Yes	25/75	25/75	10/6/2009	11/2/2009
2	Communications Infrastructure	Yes	50/50	75/25	11/3/2009	4/19/2010
3	Deployment Design	Yes	Percent Complete	25/25/50	12/15/2009	12/20/2010
4	Administration & Acquisition	Yes	Milestone Weights with % Complete	Even	11/3/2009	12/14/2009
4.1	Common Operating Picture				11/3/2009	11/9/2009
4.2	Environmental Approval from Dept. of Interior				11/3/2009	12/14/2009
m_4(1)	Start		50			
m_4(2)	Complete		70			
5	Integrated Logistics Support	Yes	50/50	Even	12/21/2010	3/14/2011

3.3 Execute, Monitor and EVM.

At this stage, periodic sequential reports can be created where actual completion dates and costs are entered and earned value tracked and reported. Graphics and standardized reports are available to display EVM metrics and trends. As tasks are completed, PMA can be used to examine what work remains, and re-optimize to maintain the desired/required schedule.



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CONTRACT PERFORMANCE REPORT																
FORMAT 1 - WORK BREAKDOWN STRUCTURE							DOLLARS IN									
<small>The public reporting burden for this collection of information is estimated to average 31 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. The provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THIS ADDRESS. SUBMIT COMPLETED FORMS TO THE ADDRESS INDICATED ON THE FORM.</small>																
1. CONTRACTOR				2. CONTRACT				3. PROGRAM								
a. NAME PrmsCo				a. NAME Develop Linked Spreadsheets				a. NAME DEVELOPMENT OF CPR SPREADSHEETS								
b. LOCATION (Address and ZIP Code) San Diego, CA				b. NUMBER 586-735-2038				b. PHASE Two								
c. TYPE FPI				d. SHARE RATIO 50/50				c. EVMS ACCEPTANCE NO YES (YYYYMMDD) MAY-BE								
5. CONTRACT DATA																
a. QUANTITY		b. NEGOTIATED COST		c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK		d. TARGET PROFIT/ FEE		e. TARGET PRICE		f. ESTIMATED PRICE		g. CONTRACT CEILING		h. ESTIMATED CONTRACT CEILING		
1		3,654,690		1587952		800,000		6,042,642		8042642		7,000,000		7,000,000		
6. ESTIMATED COST AT COMPLETION																
MANAGEMENT ESTIMATE AT COMPLETION (1)				CONTRACT BUDGET BASE (2)		VARIANCE (3)		7. AUTHORIZED CONTRACTOR REPRESENTATIVE								
a. BEST CASE 6,000,000				6,000,000		0		a. NAME (Last, First, Middle Initial) Mandel, Roger H.					b. TITLE DIRECTOR OF OPERATIONS			
b. WORST CASE 7,000,000				7,000,000		0		c. SIGNATURE								
c. MOST LIKELY 6,100,000				6,000,000		99,000										
8. PERFORMANCE DATA																
ITEM	CURRENT PERIOD						CUMULATIVE TO DATE						REPROGRAMMING ADJUSTMENTS			
	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE		REPROGRAMMING ADJUSTMENTS					
	WORK SCHEDULED (2)	WORK PERFORMED (3)	WORK PERFORMED (4)	SCHEDULE (5)	COST (6)	WORK SCHEDULED (7)	WORK PERFORMED (8)	WORK PERFORMED (9)	SCHEDULE (10)	COST (11)	COST VARIANCE (12a)	SCHEDULE VARIANCE (12b)	BUDGET (13)			
a. WORK BREAKDOWN STRUCTURE ELEMENT																
Requirement Session	0	2,699	3,000	2,699	-301	10,796	10,796	11,000	0	-204						
Assemble Project Charter	695	1,500	1,100	805	400	3,000	3,000	3,100	0	-100						
Review Project Charter	560	560	560	0	0	560	560	560	0	0						
Project Management	0	0	0	0	0	585	585	600	0	-15						
Refine Requirements Document	0	0	0	0	0	1,600	1,600	1,500	0	100						
Requirement Sign Off	0	0	0	0	0	65	65	50	0	15						
Project Management	0	553	800	553	-248	2,210	2,210	2,300	0	-90						
Design	12,821	8,954	10,000	-3,867	-1,046	16,280	14,652	15,000	-1,628	-348						
Construction	325	570	4,800	245	-4,231	325	2,848	6,000	2,523	-3,153						
Launch	0	0	0	0	0	0	0	0	0	0						
b. COST OF MONEY																
c. GENERAL AND ADMINISTRATIVE																

4. Summary

PBO 180 is the first complete end-to-end project management optimization modeling application on the market. The logic of PBO 180 provides integrated functionality that will truly optimize a project with consistency and speed. Its visionary capability serves as a robust planning front end that quickly models and optimizes budget and schedule, responding to change and “what if” scenarios in quantifiable terms of impacts on the mission or project. The model run solution sets provide the analyst with vital information where budget and schedule variances are translated into a relationship of task to performance to risk. PBO 180 arms the analyst with the capability to address variances in budget and schedule quickly and succinctly with high data integrity and quantifiable results.

This user-friendly application simplifies, accelerates, and streamlines business processes within a project or across an enterprise; size is not a limitation. Engaging PBO 180 will help your organization strengthen governance and performance management through a detailed accounting of optimized resource allocations that are defensible in any forum. The potential for realizing cost benefits and savings are tremendous and will support your organization in achieving its mission.