

**U.S. Coast Guard
Resource Allocation for
Leased Office Construction Projects**

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December 2004

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ABSTRACT

This report outlines which projects the U.S. Coast Guard (USCG) plans to fund to provide a new work environment at the Jemal Riverside office location in Washington D.C. The analysis in this report will focus on USCG's current situation, the proposed projects or alternatives to be funded, and the objectives that will meet USCG's overall goal. The final decision maker for project funding will be the Commanding Officer of the USCG Headquarters Support Command. Scott Crawley and Anoop Bhatia will be providing the analysis to the Commanding Officer by using the Analytic Hierarchy Process (AHP) and the Expert Choice Software.

BACKGROUND

Existing Conditions

The USCG Headquarters staff has outgrown its existing office space facilities in Washington, D.C. The main headquarters building (*Transpoint*) has a designed capacity to support approximately 2,300 personnel. It currently holds about 2,600 personnel. The building is thirty years old and is constructed in a typical government building fashion. The architectural accommodations are drab and plain. The floor layout is cumbersome. The utilities and technologies within the building are dated, retrofitted, or limited in some manner due to the structure.

About 200 additional headquarters staff uses office space in the nearby *Nassif* building. The lease at Nassif expires in early 2006 and all two hundred personnel must be relocated. The Nassif building is also a typical and modest government facility. It meets minimum USCG requirements.

The USCG has an estimated annual growth rate of 6%. Each location will experience needs for additional office space above and beyond current square footage requirements.

New Lease

With an expiring lease at Nassif and respectable growth each year within both buildings, the USCG was forced to locate and procure a new lease for additional office space.

The Government Services Administration (GSA) obtained a lease for USCG for two floors within the Jemal's Riverside building in Southwest D.C. This building is close to the current Transpoint building and should satisfy current and pending square footage needs.

The two floors at the Riverside building are completely vacant. The developer demolished everything on each floor. All that is left is basic structural members including concrete floor slabs, ceiling slabs, column supports, outer walls and windows. Each of the 65,000 square feet of rectangular floor area is open and clear from wall to wall and corner to corner.

Projects at New Office Site

The Commanding Officer (CO) of the USCG Headquarters Support Command is responsible for approving and allocating resources to make the two floors at the Riverside building inhabitable for office staff. Project submission input will be collected from subordinate organizational staff members, rolled into a decision making tool, and analyzed to produce the best projects to fund to provide a modern work environment for five hundred workers.

The project budget is thirteen million dollars. The completion date is June 2005.

PROJECT ORGANIZATION CHART

There are several officers within the USCG that will be influencing the decision making process for the projects to be funded at the new Riverside location. These officers and their responsibilities are shown in Figure 1.

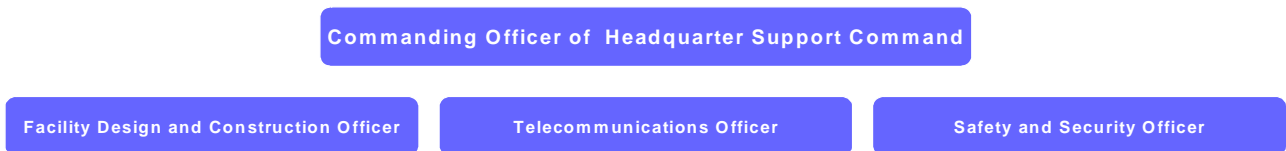


Figure 1: Project Organization Chart

Commanding Officer of Headquarter Support Command – responsible for the entire organization, projects, and well being of personal

Facility Design and Construction Officer – responsible for the overall construction and building projects for new/existing facilities for USCG

Telecommunications Officer – responsible for the overall network and communication projects for new/existing USCG buildings

Safety and Security Officer -- responsible for the overall safety and security projects for USCG and its employees

Each group above will have special projects that they respectively consider mandatory, highest priority, or necessary. This report will refer to those projects as “must” projects. Conversely, those that are deemed not mandatory, lowest priority, or unnecessary will be referenced as “must not” projects. This will be discussed further during the discussion of constraints in the *Overall Synthesis* portion of this report.

ALTERNATIVES

Alternatives ranged from basic build-out projects such as mechanical, electrical, and plumbing work to high tech prototype projects such as communication laser links, retina eye scanning machines, and fingerprint access systems. Each group from Figure 1

contributed projects to the alternatives list. A sample list of the project alternatives is shown in Figure 2.

Ideal mode	
AID	Alternative
A7	<input checked="" type="checkbox"/> Comms Lan room distribution equipment
A41	<input checked="" type="checkbox"/> Comms Laser link backup system
A22	<input checked="" type="checkbox"/> Comms motion sensors
A5	<input checked="" type="checkbox"/> Comms Network cabling
A11	<input checked="" type="checkbox"/> Comms Network jacks
A49	<input checked="" type="checkbox"/> Comms Network room basic equipment
A6	<input checked="" type="checkbox"/> Comms Network room racks/storage
A50	<input checked="" type="checkbox"/> Comms Network room test equipment
A3	<input checked="" type="checkbox"/> Comms New desktop computers
A4	<input checked="" type="checkbox"/> Comms New laptop computers
A8	<input checked="" type="checkbox"/> Comms Satellite TV system
A2	<input checked="" type="checkbox"/> Comms Telephones cabling
A1	<input checked="" type="checkbox"/> Comms Telephones handsets
A9	<input checked="" type="checkbox"/> Comms UPS backup system
A14	<input checked="" type="checkbox"/> Security Access card system
A31	<input checked="" type="checkbox"/> Security Blast film on windows
A32	<input checked="" type="checkbox"/> Security Bollards
A13	<input checked="" type="checkbox"/> Security Camera monitoring system
A15	<input checked="" type="checkbox"/> Security Emergency phones
A18	<input checked="" type="checkbox"/> Security Finger print access system
A16	<input checked="" type="checkbox"/> Security Guard force
A47	<input checked="" type="checkbox"/> Security HVAC shutdown system
A21	<input checked="" type="checkbox"/> Security Metal detectors
A43	<input checked="" type="checkbox"/> Security Outside lighting
A42	<input checked="" type="checkbox"/> Security Protected sidewalks

Figure 2: Alternative List from Expert Choice

The alternatives have been grouped into major categories for support, communications, and security projects. These clusters helped develop the objectives listed in the next section.

OBJECTIVES

In order to derive the importance of each alternative, the decision makers must determine the best high-level objectives that will help in reaching the overall goal. Analyzing the pros and cons associated with each alternative created the objectives shown in Figure 3 below.

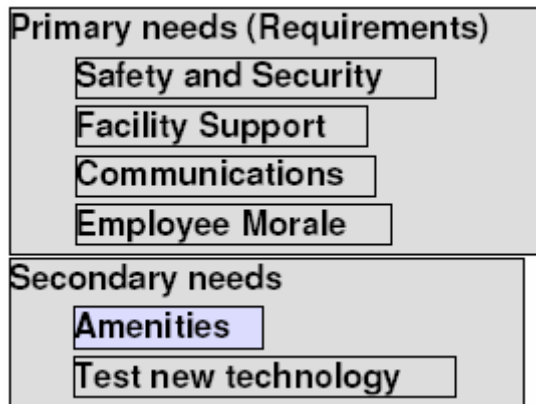


Figure 3: Objectives in Affinity Diagram from Expert Choice

Primary Needs

The primary needs are the basic necessities that any new office would require. These include the following sub-objectives.

Safety and Security

The safety and security sub-objective stresses the importance of providing physical protection for employees and the infrastructure.

Facility Support

The facility support sub-objective stresses the importance of providing architectural, mechanical, electrical, and plumbing support to the building and its occupants. These disciplines set up the core workspaces for employees and ensure they meet all national and local industry codes.

Communications

The communications sub-objective emphasizes the need for interaction between employees in local and remote locations. It also includes the need for high tech infrastructure to allow software and hardware to communicate without human intervention or monitoring.

Employee Morale

The employee morale sub-objective is listed to ensure decision makers consider the well being of the employee working in the new space. Projects that delight or provide comfort or enjoyment to employees will rank high under this objective.

Secondary Needs

The secondary needs objective provides opportunity for importance to be placed on projects that may not be necessities but may have a lot to add to the overall goal. Examples include amenities and testing of new technologies.

Amenities

The amenities sub-objective identifies importance for recreation, shopping, and dining facilities in the workspaces.

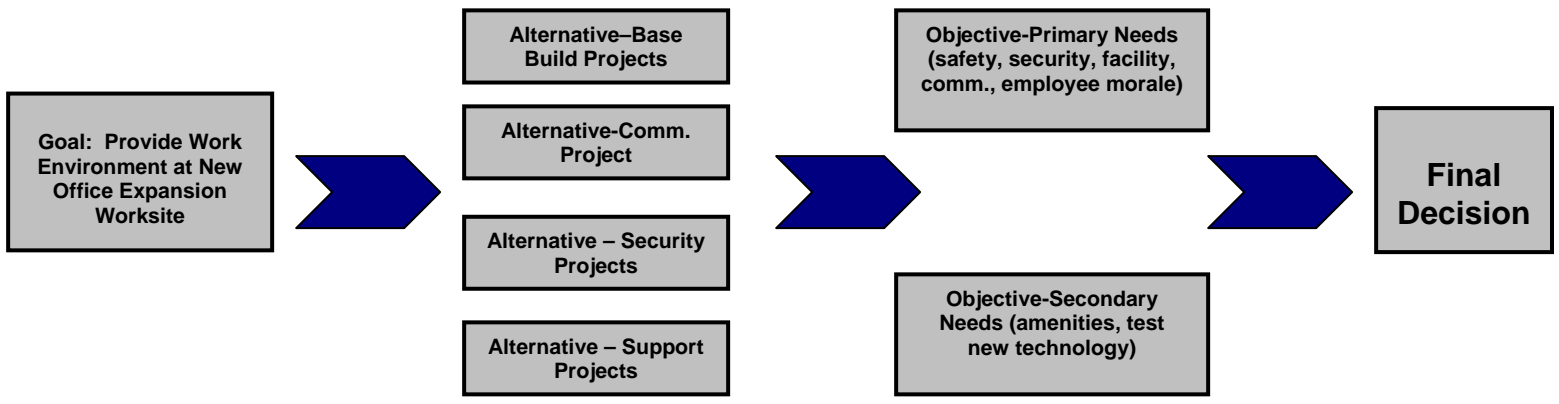
Test New Technologies

This sub-objective provides opportunity for analysis of new design and high-tech related projects. Research and development projects would fair well under this heading.

DECISION-MAKING TOOLS: AHP

Decision making tools offer structure to the decision making process. The Analytic Hierarchy Process (AHP) is a simple way to help ordinary people make complex decisions.¹ By using the AHP method, this will divide up the decision making process into 3 phases. See bullets and Figure 4 below.

1. Structure – Organize the objectives in a hierarchy
2. Measure – Using resource allocation tools and pairwise comparisons, Measure alternatives and objectives with respect to the goal.
3. Synthesis - Once all the information is entered, a synthesis will be generated in terms of a report that ranks the alternatives with respect to the goal.



¹ Forman, Ernest H., and Selly, Mary Ann, *Decision By Objectives*, World Scientific Press, 2001.

Figure 4: AHP Process

AHP is an integral part of the next tool discussed below.

DECISION-MAKING TOOLS: EXPERT CHOICE®

Expert Choice® (EC) is decision-making tool that implements AHP and has been used to frame and solve the CDC best location problem.

From the EC web page (www.expertchoice.com):

“Many decisions are too complex or too important for decision-makers to make choices based solely on instinct. No single decision-maker can meaningfully combine all of this information and make informed decisions.

Expert Choice software makes possible the synthesis of input from multiple stakeholders and provides the necessary capability to analyze, prioritize and communicate those decisions.

Based on the Analytic Hierarchy Process (AHP), Expert Choice software provides a mathematically rigorous application and proven process for prioritization and decision-making. By reducing complex decisions to a series of pairwise comparisons, then synthesizing the results, Expert Choice not only helps decision-makers arrive at the best decision, but also provides a clear rationale for the decision.

While traditional management processes and collaboration tools employ good information gathering methods – such as brainstorming sessions and surveys, they provide no accurate or thorough way to bring information together. Expert Choice provides decision makers with a proven process for synthesizing data and developing priorities in an easy to use application that doesn't require an advanced degree in decision science to implement. Our solutions are designed for business and government leaders who want to save time and improve their bottom lines by:

- *Aligning their decisions with their organizational objectives*
- *Implementing a structured, repeatable and justifiable decision making approach*
- *Leveraging organizational expertise*
- *Improving top-down and bottom-up communication*
- *Building consensus”*

Setting Up the Model

The new workspace goal, alternatives, and objectives were entered into the EC tool. This data created a model for the problem. Objectives were listed under the goal in tree diagram fashion and alternatives were listed to the right in no specific order. The information document window in the bottom right corner of Figure 5 provided additional information to help explain the intentions of each entry.

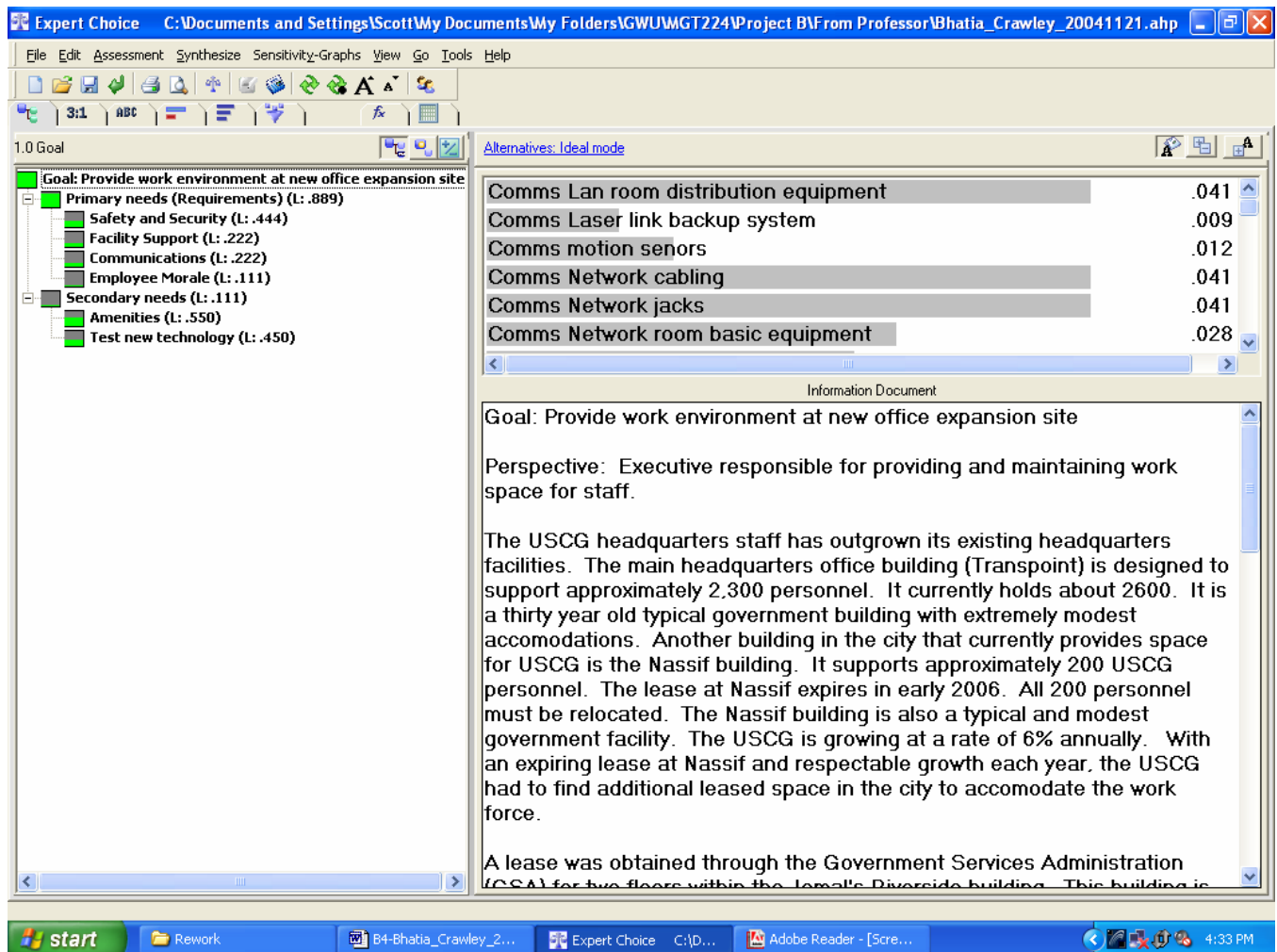


Figure 5: Main screen from EC model showing the goal, objective, and alternatives.

Rating Alternatives

Alternatives were entered in list format in the data grid show in Figure 6.

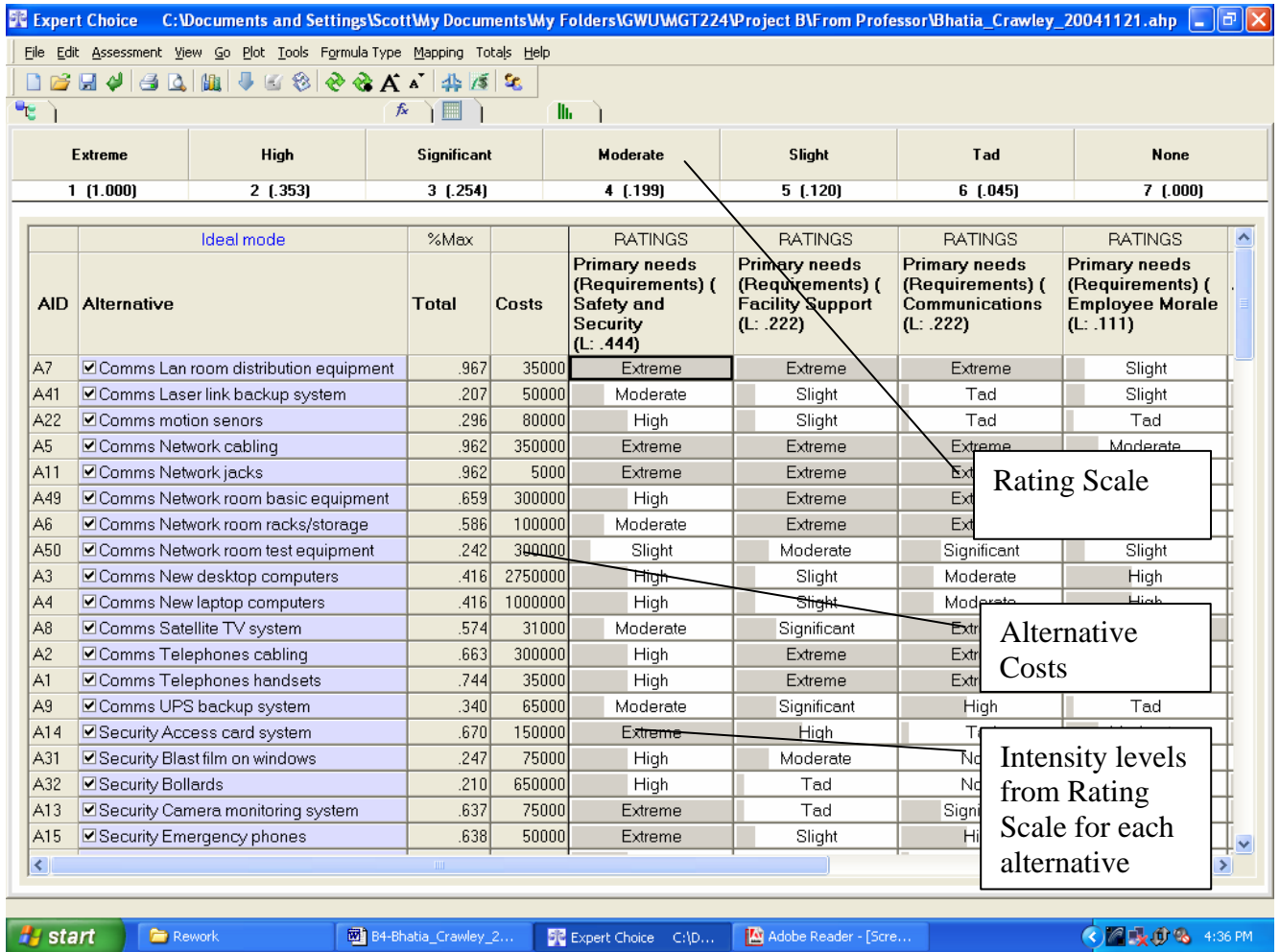


Figure 6: Data Grid from Expert Choice

A custom rating scale was created to rate intensities for each alternative with respect to the objective. See Figure 7 for the ratings list and the derived intensity levels.

Intensity Name	Priority
Extreme	1.000
High	.410
Significant	.254
Moderate	.199
Slight	.120
Tad	.045
None	.000

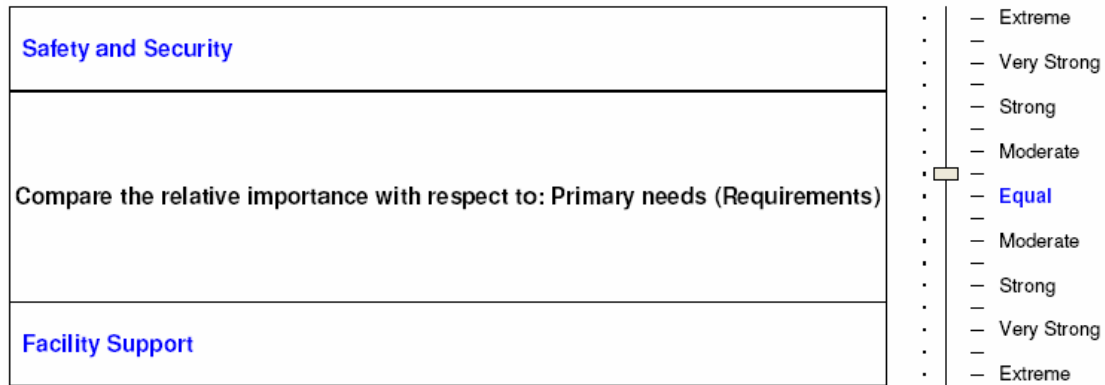
Figure 7: Rating Scale from Expert Choice

Pairwise Comparisons of Objectives

Following the ratings for each alternative, the data for each alternative was extracted to the alternative section of the EC model.

Pairwise comparisons were conducted on each objective and sub-objective to assign importance of each with respect to the goal. An example of a pairwise comparison is shown in Figure 8 below.

Verbal Assessment



	Safety and	Facility Sup	Communica	Employee M
Safety and Security		2.0	2.0	4.0
Facility Support			1.0	2.0
Communications				2.0
Employee Morale	Incon: 0.00			

Figure 8: Pairwise Comparison from Expert Choice

After pairwise comparing is complete, the model yields derived priorities for all objectives and sub-objectives. See Figure 9.

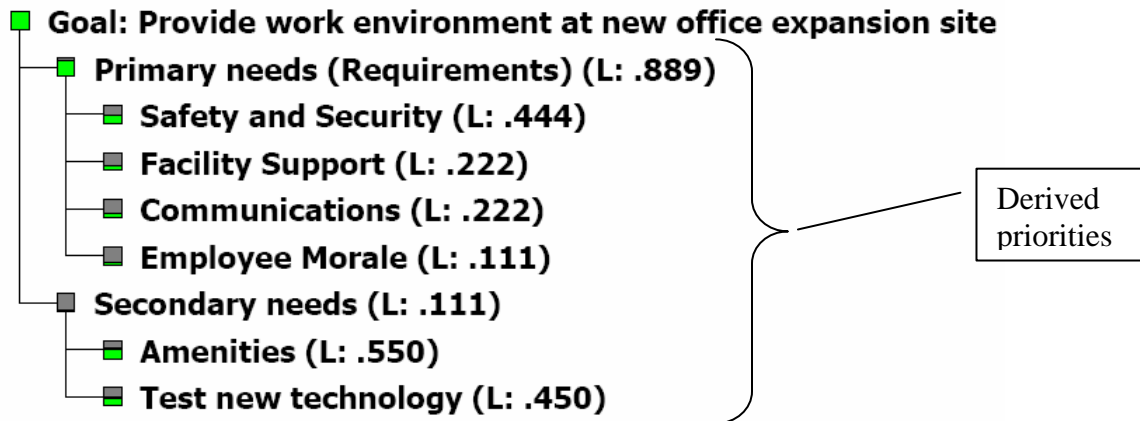


Figure 9: Objective and Sub-Objective Priorities Derived in Expert Choice

Resource Aligner

The Resource Aligner (RA) function within EC and accessed here in the Data Grid will assist in finding the correct balance of projects to fund and to not fund. The output is shown in Figure 10.

Expert Choice Resource Aligner							
<u>Budget Limit</u>	<u>Cost</u>	<u>Benefits</u>	/	<u>Base Case Maximum</u>	=	<u>Percent</u>	
13,000,000	13,000,000	19.067	/	23.741	=	80.31	
	<u>Musts</u>	<u>Must</u>	<u>Custom</u>	<u>Depend</u>	<u>Groups</u>	<u>Funding</u>	<u>Risks</u>
<u>Defined:</u>	<input checked="" type="checkbox"/>	<u>Not</u>	<u>Constraints</u>	<u>encies</u>	<input type="checkbox"/>	<u>Pools</u>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AID	Alternative Name	Funded	Benefit	Cost	Partial	Must	Must
A7	Comms Lan room distribution equipment	YES	.967	35,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A41	Comms Laser link backup system	YES	.207	50,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A22	Comms motion sensors	YES	.296	80,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A5	Comms Network cabling	YES	.962	350,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A11	Comms Network jacks	YES	.962	5,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A49	Comms Network room basic equipment	YES	.659	300,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A6	Comms Network room racks/storage	YES	.586	100,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A50	Comms Network room test equipment	NO	.242	300,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A3	Comms New desktop computers	NO	.416	2,750,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4	Comms New laptop computers	NO	.416	1,000,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 10: Sample Resource Aligner Data from Expert Choice

The Resource Aligner allows the user to set an overall budget and to define several kinds of project constraints. A quick scan of Figure 10 above shows alternatives and their budgets as well as constraints related to partial funding, must fund projects and must not fund projects. The following paragraphs outline the constraints used in this project.

Constraints

Those in control of the RA program may encourage or discourage funding of certain projects by manually setting constraints.

Financial Constraints:

The budget for the entire goal was fixed at \$13M due to the previous year's budget build process. There is opportunity for this number to increase or decrease due to outside influences in overall USCG fiscal demands, but for the purpose of this discussion, it will

be considered solid. If all projects were funded, the budget would need to be a little over \$23M.

The project costs were estimates submitted by contributing sponsors of each project. Better cost estimating or competitive quoting could improve the validity of each project budget.

Absolute Constraints (Partial, Must, Must Not):

Executives may manually pass favorable or unfavorable opinion of funding projects by selecting options to partially fund, completely fund (must), or completely not fund (must not.)

The Comms Network Room Test Equipment project and the Support Mailroom project received the manual constraint to receive partial funding. Both projects are nice to have projects that could easily be broken into smaller subprojects and receive approval through partial funding.

Projects were selected as “Must” projects when they were absolutely needed to satisfy the goal or were in some way considered sacred cows by the decision makers. Examples of “musts” include architectural-engineering projects like mechanical, electrical, and plumbing work. “Musts” also include very necessary communications infrastructure projects like cabling, jack outlets, and telephone equipment. Security projects to keep the workforce safe and secure like a guard force and a building access control system are also very much needed.

“Must not” projects are identified when an executive feels strongly that a project should not receive funding. This could not now or could be not ever. The Barber, Cafeteria, and Gym projects were listed as “must not” because these services are already provided at a neighboring building. Providing them at the new site would be an unnecessary duplication.

The program automatically solves the resource allocation problem based on the data and settings and produces results showing which alternatives receive funding and which do not.

Overall Synthesis

The following Figure 11 presents a rank order of projects in order of importance as derived through use of Expert Choice. This list is prior to implementing any constraints.

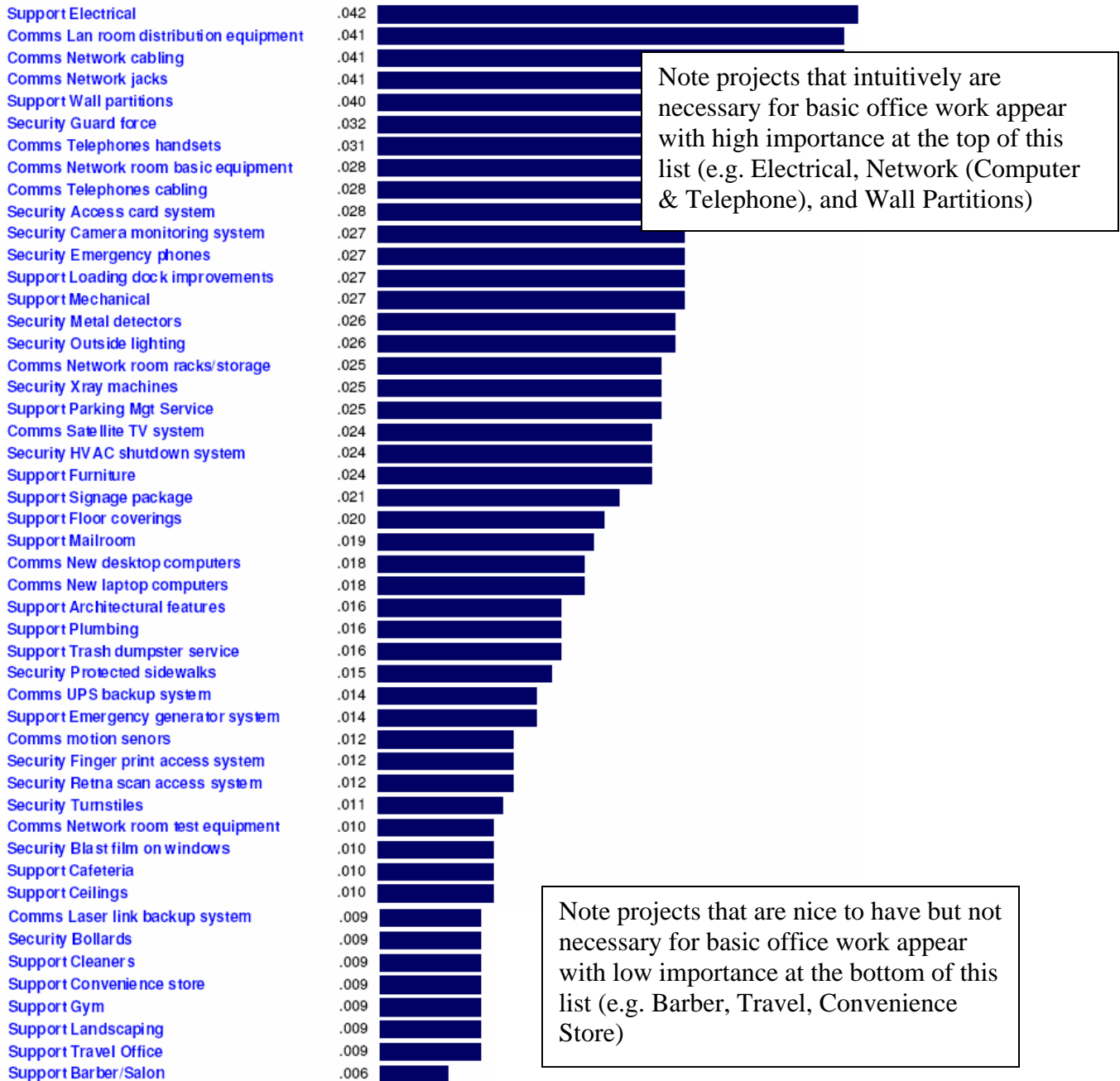


Figure 11: Synthesis summary from Expert Choice

Figure 12 presents the final resource allocation showing the alternative projects that are funded with the existing budget of \$13M.

Expert Choice Resource Aligner							
<u>Budget Limit</u>	<u>Cost</u>	<u>Benefits</u>	/	<u>Base Case Maximum</u>	=	<u>Percent</u>	
13,000,000	13,000,000	19.067	/	23.741	=	80.31	
<u>Defined:</u>	<u>Musts</u>	<u>Must</u>	<u>Custom</u>	<u>Depend</u>	<u>Groups</u>	<u>Funding</u>	<u>Risks</u>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Alternative Name</u>	<u>Funded</u>	<u>Benefit</u>	<u>Cost</u>	<u>Partial</u>	<u>Must</u>	<u>Must Not</u>	
A7	Comms Lan room distribution equipment	YES	.967	35,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A41	Comms Laser link backup system	YES	.207	50,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A22	Comms motion sensors	YES	.296	80,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A5	Comms Network cabling	YES	.962	350,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A11	Comms Network jacks	YES	.962	5,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A49	Comms Network room basic equipment	YES	.659	300,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A6	Comms Network room racks/storage	YES	.586	100,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A50	Comms Network room test equipment	NO	.242	300,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A3	Comms New desktop computers	NO	.416	2,750,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A4	Comms New laptop computers	NO	.416	1,000,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A8	Comms Satellite TV system	YES	.574	31,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A2	Comms Telephones cabling	YES	.663	300,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A1	Comms Telephones handsets	YES	.744	35,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A9	Comms UPS backup system	YES	.340	65,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A14	Security Access card system	YES	.670	150,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A31	Security Blast film on windows	YES	.247	75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A32	Security Bollards	NO	.210	650,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A13	Security Camera monitoring system	YES	.637	75,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A15	Security Emergency phones	YES	.638	50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A18	Security Finger print access system	YES	.281	150,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Expert Choice Resource Aligner							
<u>Budget Limit</u>	<u>Cost</u>	<u>Benefits</u>	/	<u>Base Case Maximum</u>	=	<u>Percent</u>	
13,000,000	13,000,000	19.067	/	23.741	=	80.31	
<u>Defined:</u>	<u>Musts</u>	<u>Must</u>	<u>Custom</u>	<u>Depend</u>	<u>Groups</u>	<u>Funding</u>	<u>Risks</u>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Alternative Name</u>	<u>Funded</u>	<u>Benefit</u>	<u>Cost</u>	<u>Partial</u>	<u>Must</u>	<u>Must Not</u>	
A16	Security Guard force	YES	.753	500,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A47	Security HVAC shutdown system	YES	.565	250,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A21	Security Metal detectors	YES	.617	200,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A43	Security Outside lighting	YES	.608	75,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A42	Security Protected sidewalks	YES	.347	80,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A17	Security Retna scan access system	YES	.281	200,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A19	Security Turnstiles	NO	.255	250,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A20	Security Xray machines	YES	.597	200,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A45	Support Architectural features	YES	.385	200,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A28	Support Barber/Salon	NO	.147	100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A25	Support Cafeteria	NO	.244	3,000,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A37	Support Ceilings	YES	.232	150,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A29	Support Cleaners	NO	.216	50,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A27	Support Convenience store	NO	.216	175,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A39	Support Electrical	YES	1.000	1,000,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A10	Support Emergency generator system	NO	.324	1,100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A38	Support Floor coverings	YES	.487	1,500,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A12	Support Furniture	YES	.578	5,000,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A26	Support Gym	NO	.216	300,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A33	Support Landscaping	NO	.221	100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A24	Support Loading dock improvements	NO	.631	300,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A34	Support Mailroom	.747	.446	300,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A40	Support Mechanical	YES	.650	900,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A23	Support Parking Mgt Service	NO	.591	100,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A44	Support Plumbing	YES	.383	100,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A46	Support Signage package	YES	.488	70,000	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Expert Choice Resource Aligner							
<u>Budget Limit</u>	<u>Cost</u>	<u>Benefits</u>	/	<u>Base Case Maximum</u>	=	<u>Percent</u>	
13,000,000	13,000,000	19.067	/	23.741	=	80.31	
<u>Defined:</u>	<u>Musts</u>	<u>Must</u>	<u>Custom</u>	<u>Depend</u>	<u>Groups</u>	<u>Funding</u>	<u>Risks</u>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Alternative Name</u>	<u>Funded</u>	<u>Benefit</u>	<u>Cost</u>	<u>Partial</u>	<u>Must</u>	<u>Must Not</u>	
A35	Support Trash dumpster service	YES	.381	50,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
A30	Support Travel Office	NO	.216	50,000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A36	Support Wall partitions	YES	.949	450,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				23,301,000			

Figure 12: Final Resource Aligner Data Showing Funded Alternatives

The output from the RA above shows that shaded projects from the list of alternatives should receive funding. Projects not shaded should not be funded. The RA solution was derived after entering a budget of \$13M and applying the constraints imposed on each of the alternatives.

Figure 13 below shows the increase in percentage of alternatives funded as the budget increases. The largest leaps in percentage funded are shown between \$11M and \$12M and again between \$12M and \$13M. After this, more projects do get funded but the benefits are much less.

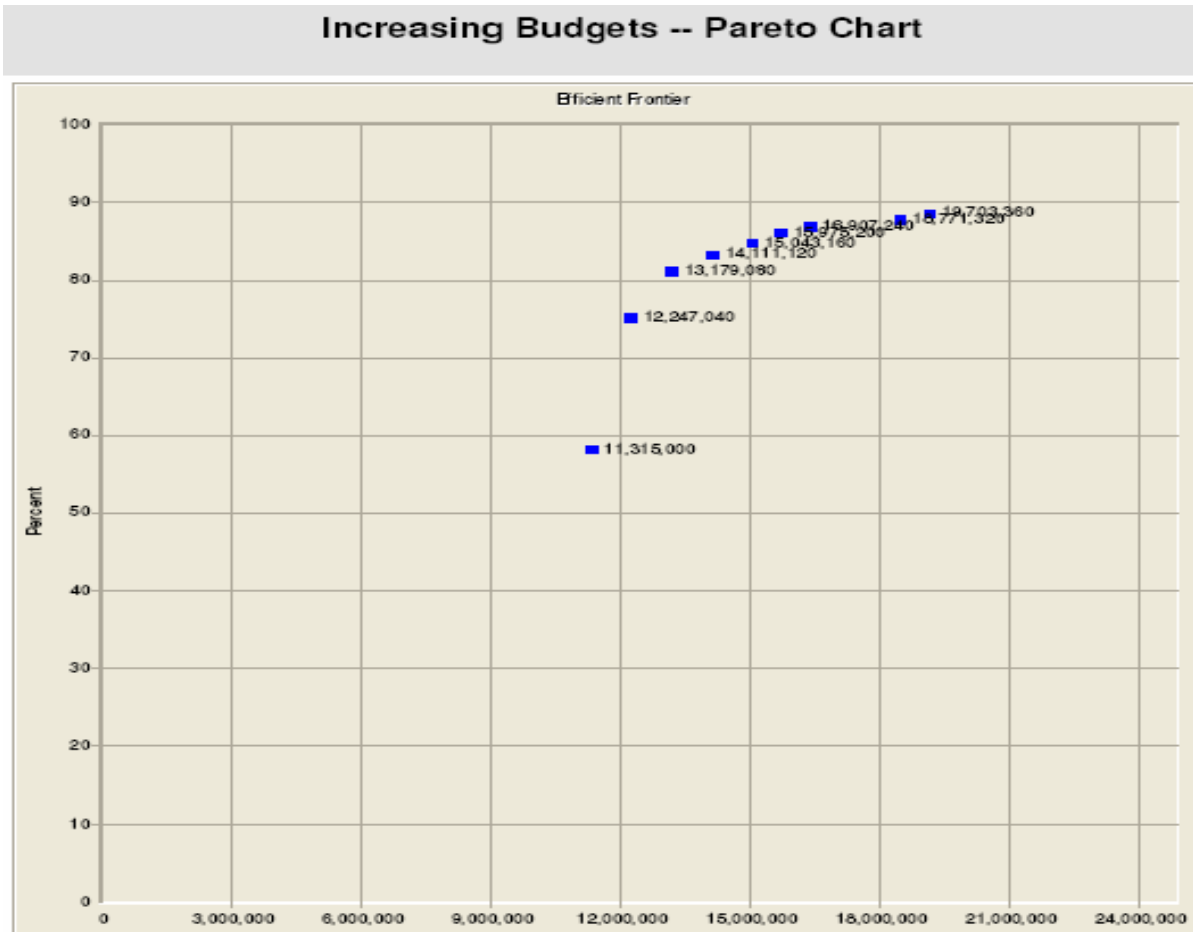


Figure 13: Increasing Budgets Graph from Resource Aligner Data in EC

Conclusion

This model analyzed numerous alternatives clustered under the support, security and communications headings. The result of custom intensity ratings for alternatives as they relate to objectives, pairwise comparisons of the objectives, and standard EC constraints on alternative funding provided a list of projects to fund with the given \$13M budget.

Given more or less budget, the resource aligner may produce an entirely different set of projects to fund. The list of funded projects could be longer or shorter. The budget for this project remains relevant until the budget is increased beyond \$19.2M. At that point, the overall project would have enough budget to fund each alternative. A budget lower than \$13M would require input from the decision maker to assign a new budgetary number and to set and release constraints. Eventually, the user will iterate the data within the model to a comfortable list of alternatives that will satisfy the primary and secondary needs of setting up a work environment at the Coast Guard's new office expansion site.

This model and the result will be shared with senior executives within the Coast Guard. Input from these executives will be collected and the model will be adjusted if necessary to better represent opinions of the senior Coast Guard leadership.

Reference

Forman, Ernest H., and Selly, Mary Ann, *Decision By Objectives*, World Scientific Press, 2001. Available: <http://mdm.gwu.edu/forman>.

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