

Need for Considering Alternatives

Meaning of Alternative Analysis

Alternative analysis is the evaluation of the different choices available to achieve a particular project management objective. It is an analytical comparison of different factors like operational cost, risks, effectiveness as well as the shortfalls in an operational capability. It requires different tools such as life-cycle costing, sensitivity analysis, and cost-benefit analysis. With alternative analysis, options to the solution are identified to satisfy the needs of an existing or new program.

It is one of the crucial documents produced needed for program reviews and milestones within a project management plan. Most project managers need an alternative analysis before they can even start with the program. The recommendations from the alternative analysis determine whether another program should commence or if the existing one should be continued.

Alternative analysis is often performed to give decision-makers choices for continuing existing programs or starting a new one. With this, it identifies cost-effective actions to avoid duplication of efforts as well as decrease the risks in delivering successful programs in the future.

Alternative analysis is often performed by the Department of Defense Homeland Security and Treasury but commercial industries also do this. However, the latter tends to focus on the life cycle cost, operational, and technical risks.

Usage of Alternative Analysis

- 1. Use Analysis of alternatives as part of good project management.** The Analysis of alternatives process should be seen as a good project management practice for different decisions on multiple types of projects. It should show that sound processes and techniques were followed in recommending a specific solution.
- 2. Create an appropriate Analysis of alternatives study plan.** A major step leading to a successful Analysis of alternatives is the creation of a well-considered study plan. The study plan establishes a roadmap for how the analysis should proceed, who is responsible for doing

what, and why it is being done. A sample Analysis of alternatives study plan template is provided in.

- 3. Ensure sufficient time and resources.** A significant risk to success is the lack of time and other resources to adequately perform an Analysis of alternatives. Critical to implementing a robust Analysis of alternatives, advance planning should include maintaining awareness of key need dates and provisioning of funds, staff, data, and other resources. The Government Accountability Office (GAO) found that many Analysis of alternatives are conducted under compressed time frames—six months or less—or concurrently with other key activities that are required for program initiation in order to meet a planned milestone decision or system fielding date. Consequently, Analysis of alternatives may not have enough time to assess a broad range of alternatives and their risks, or they may be completed too late to inform pre-development trade discussions.
- 4. Know the baseline/status quo alternative.** For many Analyses of alternatives, a legacy capability exists and may either be near end of life or no longer satisfy current needs. In these cases, it is critical to understand the existing capability baseline so that the Analysis of alternatives includes an upgrade path from the status quo. If information about the current capability is not already in hand, you will need to capture its baseline to compare against potential upgrades. Collecting baseline information can be a resource-intensive activity, which must be accounted for in developing schedule and staffing needs.
- 5. Know your stakeholders.** Understand the decision makers and other stakeholders involved with or impacted by the Analysis of alternatives and how they will participate in the Analysis of alternatives and/or use the results. To inform the scope and execution of the analysis, assess the stakeholders' political, operational, economic, and technical motivations. Leverage community and user stakeholder knowledge to help determine objectives and criteria used to evaluate solutions. Develop recommendations for how the various stakeholders will participate in the Analysis of alternatives (e.g., Responsible, Accountable, Consulted, and Informed) and discuss them with the Analysis of alternatives principal customer.
- 6. Build an appropriate Analysis of alternatives team.** Building an Analysis of alternatives team requires the early identification of individuals with the right skills/expertise (e.g.,

specific domains, analytic expertise), level of experience, organizational perspectives, and authorities. It also requires the specification of "rules of engagement" for interaction throughout the analysis, including gaining and maintaining "buy-in" of objectives and execution plans. SMEs should be recognized experts in their areas. They should not be selected for organizational affiliation or balance. Some civilian agency guidance [6] calls for the government to select an organization to conduct the Analysis of alternatives that is independent of both the organization that will acquire and use the solution and the organization sponsoring the acquisition.

7. **No "box checking."** Ensure that the analytic results inform the decision-making process rather than the validation of a preferred alternative so that the Analysis of alternatives functions as an unbiased assessment rather than a box-checking exercise.
8. **Maintain broad context.** Multiple perspectives should be brought to bear in the Analysis of alternatives, including operational/mission, technical/technological, programmatic, and any other areas that influence the value of solutions.
9. **Use appropriate methods, tools, and data; understand links.** Select methods, tools, and data to execute the Analysis of alternatives and its component analyses (e.g., cost, effectiveness/benefit, and risk) to produce products and recommendations that support the decision-making process. Analysis of alternatives participants must seek appropriate data sets that work together with selected methodologies and tools (e.g., simulation models) to avoid "garbage in/garbage out" issues. Analysis of alternatives participants must make appropriate linkages between the component analyses (e.g., schedule and cost).
10. **Ensure the right number of alternatives.** A 2009 GAO report on defense acquisitions attributes premature focus or convergence on a particular solution or range of solutions as a failing of Analysis of alternatives. If stakeholders are already enamored of a particular solution, completing an unbiased Analysis of alternatives may be difficult. A narrow scope or attention paid to a particular solution renders the Analysis of alternatives ineffective for decision making and often foreshadows increased risk in the resulting program.

Identify multiple alternatives to address the problem within the Analysis of alternatives context and scope. Explore a broad range of alternatives to ensure the best value and technical match to the need. Brainstorming can be useful in identifying the superset of alternatives for consideration. The final set of alternatives should be the product of thorough research, vetting, and filtering and should be traceable and defensible. For each alternative, define a technical baseline as a foundation for its assessment.

11. Anticipate data problems. Analyzing a broad range of solutions involves collecting and developing a considerable amount of information on the representative solutions as well as on other contextual details/supporting information (e.g., specific guidance, regulatory environment). It is critical to develop credible data sets to support an Analysis of alternatives. Develop a data collection plan and create back-up plans in case data access problems arise, particularly when the Analysis of alternatives schedule is aggressive/compressed. Consider and leverage industry, government, contractor, and/or FFRDC data sources. Realistic assumptions going into an Analysis of alternatives are that not all information will be available and that workarounds will be needed. Be persistent!

12. Ensure appropriate risk analysis. The GAO reports that some Analysis of alternatives do not examine risks at all and focus only on the operational effectiveness and costs of alternatives. Other Analysis of alternatives have relatively limited risk assessments. For example, several Analysis of alternatives did not include integration risks even though the potential solution set involved modified commercial systems that would require integration of subsystems or equipment. The GAO cited a Defense Science Board (DSB) report on buying commercially based defense systems. Programs that did not assess the systems engineering and programmatic risks of alternatives associated with militarizing commercial platforms or integrating various commercial components underestimated the true costs. Other Analysis of alternatives did not examine the schedule risks of the various alternatives, despite accelerated schedules and fielding dates for the programs. Not surprisingly, the GAO found that programs that conducted a comprehensive assessment of risks tended to have better cost and schedule outcomes than those that did not. For more information on risk identification and management, see the Risk Management topic and articles in this SEG section.

13. Presentation of the final results. An Analysis of alternatives may not identify one definitive solution. In these situations, it is critical that decision makers have insights into the pros and cons of each alternative and are provided with all information that is relevant to them. The presentation of results should be thought about early in the Analysis of alternatives process, based on decision-maker and stakeholder preferences.

The need of considering alternative concepts

Even if the systems engineer has a feasible and attractive concept for achieving a set of requirements, it is important that alternatives are carefully considered before selecting the solution for development. This is true for at least six reasons.

- 1. A systems engineer should have a “Plan B” for every system.** Even if an attractive option exists, the system engineer must consider alternatives to the point of knowing that they are possible solutions. This will allow the program to later pivot quickly to Plan B, if needed.
- 2. As the system develops, new information may make the once attractive option less attractive.** In other words, as the system develops, the customer may change their mind on requirements. If the systems engineer did not investigate alternatives, then the system development may have to come to a complete stop if the customer changes requirements and alternatives cannot be readily offered.
- 3. The assessment that the current solution is feasible and attractive may be wrong.** There may be a more attractive alternative and unless an investigation is done, it will not be known. It is important for the systems engineer to confirm that an attractive and feasible solution is indeed the right solution.
- 4. Competitive analysis is important and considering alternatives can lead to a better understanding of the offerings by competitors.** This is because it is often the case that an investigation of alternatives leads automatically to the analysis of published or strategic knowledge of competing systems. This can help ensure that the system is indeed the correct solution. It may be that the program will be cancelled because the customer found out that a better system is available. This occurred with a Boeing missile program.

5. **The possibility of increased technical content.** An investigation of alternatives can uncover a solution that may have increased technical content to provide capabilities that are attractive to the customer.
6. **Investigating alternatives provides options for risk reduction.** If alternatives are considered, then as concept development on the primary solution progresses, the program manager may recognize an opportunity to risk reduce the program by performing small tests or prototypes that can be put “in his hip pocket” just in case there is a need to pivot to a Plan B. If the systems engineer had not investigated alternatives, then he will not likely recognize these types of opportunities, if they present themselves.