



Analysis of Alternatives (AoA) Based Decisions

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An old adage goes: “budget, schedule, or function, choose two.” But, for many technology, business, and government projects, even achieving targets on two of these three basic dimensions is challenging. Consider the *Chaos Report*, an annual analysis of information technology (IT) projects. In 2009, fully 44 percent of all projects were delivered late or over budget and an additional 24 percent were cancelled. Only 32 percent of projects completed were on time and on budget with full functionality. Or, the results of a recent GAO study of DoD acquisition projects showed that 56 percent had “moderate to high” cost/schedule growth.

Why is it so hard to keep projects on schedule, within cost, and on scope? While success is dependent on management, it is even more a function of the early decisions—when the project’s schedule, budget, and function are first specified. If this is done poorly, no amount of good management is going to help a project meet even two of the basic attribute targets.

In response to the missed targets, some government agencies have begun to require *Analysis of Alternatives* (AoA) prior to funding acquisitions. AoA is the process that guides the analytical comparison of multiple alternatives to be completed

before committing resources to a project. It ensures that new projects, programs, processes, policies, or other organizational changes have a sound, defensible, executable business case with known risks. AoA attempts to overcome the three main reasons that 50 percent of all business decisions fail: a poor decision-making process, choosing one alternative too soon, and working on the wrong things (Paul Nutt in *Why Decisions Fail*).

We define the four levels of AoA maturity:

- *Level 0:* Propose one alternative and justify it. This is the default often seen in technology, business, and government projects.
- *Level 1:* Propose multiple alternatives and provide a one-dimensional comparative analysis with some inclusion of risk. This level is now required by the Office of Management and Budget for all government acquisitions.
- *Level 2:* Propose multiple alternatives and provide multidimensional comparative analysis with some inclusion of risk. This level is required for all DoD acquisitions. The GAO results showed that, with no AoA (Level 0), 52 percent of the projects failed whereas only 22 percent of them failed with Level 2 development.
- *Level 3:* Propose multiple alternatives, provide multidimensional comparative analysis, and support robust resource-allocation decisions with the inclusion of risk/uncertainty effects.

We develop these levels in a full version of this article available at www.robustdecisions.com/AOA_MORS_paper.pdf.

AoA success focuses on ten key components that define the levels of maturity, as Table 1 shows. The components force consideration of multiple alternative solutions evaluated across multiple cost and performance criteria. They emphasize early consideration of uncertainty and risk, stakeholder buy-in, and a process for deciding what to work on next to ensure the best alternative is chosen. Addressing these key components greatly improves the odds of meeting project cost, schedule, and functional goals.

In the full article, we focus on:

- *Component 3:* Simple, original methods to capture the discriminating criteria—the measures the stakeholders really care about.
- *Component 4:* Original research that will alert readers about the poor quality of evaluations.
- *Component 5:* Recently developed methods to capture risk and uncertainty.
- *Component 6:* How to use AoA as a tool to build stakeholder buy-in.
- *Component 8:* How the results of AoA guide what to work on next and why this is as important as choosing the best alternative.

Although AoAs take time and use resources at the beginning of project, they save time and money later. This “front-loading” of projects is very difficult for individuals and organizations. A major goal of the article is to convince the reader that AoAs are worth the effort for any project that requires significant resources or stakeholder buy-in, and to give them the tools and resources to help them better achieve success on all three dimensions: cost, time, and function.

This article is a combination of original work by the authors and the synergy of the work of others. Dr. David Ullman, president of Robust Decisions, has been studying and developing decision making methods as an academic and practitioner for more than fifteen years. He has primarily focused on the effect of uncertainty on decision risk, and the building of stakeholder buy-in. Lieutenant Colonel(R) Richard Ast, currently a senior analyst in ANSER, has practiced AoA in the Pentagon and on the ground in Iraq. Both now focus on bringing AoA into wider use in business, technology and government.

Table 1.
The ten key components that define the levels of maturity.

	Ten Key AoA Components	Level			
		0	1	2	3
1	Develop Multiple Alternatives		X	X	X
2	Evaluate Lifecycle Cost		X	X	X
3	Define Criteria			X	X
4	Evaluate Alternatives versus Criteria			X	X
5	Evaluate Effect of Uncertainty/Risk		X	X	X
6	Build Stakeholder Buy-in				X
7	Compare Alternatives		X	X	X
8	Decide What To Do Next				X
9	Select Best Alternative		X	X	X
10	Report Results		X	X	X