

Cost Engineering in Planning Studies

March 5, 2020

Q&A Session

This webinar provided an overview of cost engineering, cost-schedule risk analysis (CSRA), and the cost Agency Technical Review (ATR) process in planning studies. Presented by Mike Jacobs (Chief, USACE Cost Engineering Mandatory Center of Expertise), the webinar included an overview of the cost engineering requirements, level of detail, and products required at each planning milestone, as well as a discussion of best practices and lessons learned from past studies.



This summary of the Question / Answer session of the webinar is not a transcription; questions and responses have been edited and reordered for clarity.

What does the Mandatory Center of Expertise (MCX) consider to be "high contingency" versus "low or acceptable contingency" in a cost estimate?

What is considered to be an acceptable contingency percentage really depends on the specific project in question and its individual challenges and inherent risk. Cost estimates with over 50% contingency have been approved by the MCX because of the high risk associated with the project (e.g., unproven hydrologic modeling), but the "norm" is typically somewhere between 20% and 30%.

The presentation mentioned that one of the components of the formal CSRA is a Monte Carlo model; can you explain more about how the MCX uses this model?

First, we study the risks qualitatively and sort them into categories. We then itemize all of the moderate and high risks and study them further to determine the range of costs associated with various scenarios for each risk item based on the cost estimate, and put those costs into the Monte Carlo model to see what happens to the total project costs. Monte Carlo simulations sample from a probability distribution to produce hundreds or thousands of possible outcomes. The results are analyzed to get probabilities of different outcomes occurring to provide the overall project risk. It should be stressed that 100% of the physical scope of the project needs to be included in the base cost estimate so that no potential risks are missed.

How is the Cost Engineering MCX's ATR coordinated with the ATR conducted by other disciplines?

When we're doing the cost ATR we're actually working for the PCX that is managing and coordinating the full technical review (as the Review Management Organization). The PCX will coordinate the cost ATR with the other disciplines' reviews.

Can a project delivery team (PDT) eliminate an alternative "qualitatively" because of its anticipated cost when the team is narrowing down its final array of alternatives before the alternatives milestone meeting, or does there have to be another reason to eliminate it that early on in the study? For example, what if the sponsor simply can't afford a project above a certain price threshold?

The inability of a sponsor to afford a certain measure or alternative is not typically justification for elimination and we should not put a "cost limit" on measures/alternatives during plan formulation. Reasonable alternatives should always be carried forward and after plan selection, the sponsor may request a Locally Preferred Plan (LPP) if it cannot afford the project. However, certain restrictions apply to the selection of an LPP, and the appropriate guidance should be considered.

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Measures or initial alternatives can be eliminated due to extreme cost (that is unrelated to affordability), but only when it is clear that the benefits provided by that measure/alternative could be provided more efficiently by another plan. In that instance, certified costs are unnecessary, but at least a rough cost estimate or order of magnitude should be provided for documentation. Additionally, even if it is obvious that a measure or initial alternative would be clearly less efficient than others, factors such as life safety, social and environmental effects, etc., should at least be considered by a PDT before screening or elimination. A detailed analysis is rarely necessary and if there is a question, discussion with the appropriate members of the vertical team can usually provide direction.

Another consideration is categorical exemptions. Categorical exemptions for National Economic Development (NED) plans are discussed in the [Planning Guidance Notebook \(ER 1105-2-100\)](#), Sections 3-3.b.(10) and 3-3.b.(11) for navigation and flood risk management studies, respectively. For a navigation project categorical exemption, a plan with greater net benefits than smaller scale plans can be recommended without having to analyze deeper channel plans. Similarly for a flood risk management categorical exemption, a plan with greater net benefits than plans with lower levels of protection can be recommended without analyzing plans with higher levels of protection. There are certain restrictions to both scenarios that are spelled out in the guidance. Also, if a categorical exemption is going to be utilized, it must be stated explicitly.

Does USACE have a decision change log template?

There is a decision log tool available on the [IWR-APT site](#) for use by PDTs.

On a related note, a new Risk Register tool being developed by the Institute for Water Resources (IWR) builds off of the current Planning Risk Register in the IWR-APT to cover the full project range – from planning through construction. Those interested in testing the new tool and providing feedback on the changes should reach out to Rachel Grandpre.