APPLYING RISK MITIGATION TECHNIQUES

by Mark Bridgers

There were significant differences in the perception and mitigation of selected risks among capital asset, facility, and infrastructure owners, developers, and various operators. Public agencies are more risk adverse and perceive many risks as having higher impact or higher frequency than other respondents. This perception creates an opportunity for utility contractors.

Author’s note: The Spring 2018 issue of the NUCA Business Journal featured Part I of my two-part Risk Management article, which introduced the concepts of risk identification and risk analysis as the first two steps in an effective risk management system. Critical to this process in Part I was the use of the Trees and/or Forest techniques to identify and analyze risks. A summary of these techniques is in the blue box on page 13. If you did not read Part I you may want to read it first. Part II of the article, Applying Risk Management Techniques, will explore these techniques and briefly review how risk implement/control approaches are applied. The article will also explore how the perspectives of state or local agencies differ from utility contractors and review their perceptions of risk and approaches to risk management.

Risk Mitigation

An industry study conducted by the Construction Management Association of America (CMAA) asked capital asset, facility, and infrastructure owners, developers, and operators to respond to a series of questions regarding their risk management philosophies and approaches. The study yielded insights into how respondents perceived risk and chose to mitigate it. The owners’ method of mitigation has implications for utility contractors when these risks are transferred or ignored. The following general risk mitigation strategies and insights were drawn from the CMAA study and demonstrate some of respondents’ flaws of risk mitigation: 1

• Throwing Money at the Problem: 33% of the time, agencies or owners request a budget increase as their primary risk mitigation strategy.
TREE AND FOREST ASSESSMENT OF RISK MANAGEMENT

When assessing risk, analysis demands more than simply relying on traditional risk management techniques. Contractors need to look at two distinctly different types of risk—Tree assessment and Forest assessment.

The Trees

The Trees risk assessment approaches risks that tend to occur with frequency and severity and fall within three standard deviations from the expected mean. These risks tend to lend themselves to traditional risk analysis and require robust analysis, including at least four steps:

1. Develop a robust list of risks. 2. Collect the necessary data to develop accurate forecasts of frequency and severity of these risks using statistical methods like linear regression. 3. Develop mitigation strategies and tactics where contractors, engineers, insurance professionals, and owners work collaboratively to select the most robust risk management approach for each risk: accept and manage, accept and transfer, recognize and ignore, or avoid. 4. Select a strategy or tactic to control the risk or exposure to the risk.

Once each of these steps is applied to the traditional risks, it is necessary to step back and take a look at the “Forest” of risks faced.

The Forest

The most immense and severe impacts during capital construction projects are unpredicted (but not unpredictable)—infrequent events that happen with greater regularity than anticipated. The Forest approach relies upon a scenario planning technique to address difficult to define, nontraditional risks. These difficult to define and nontraditional risks tend to be better understood and mitigated when applying the following steps to them:

1. Develop a robust list of non-traditional or difficult to define risks. 2. Describe a set of environments or scenarios; typically, a minimum of four and maximum of eight, in which construction may take place in the future. 3. Focus on recognizing their range of impact for potential for extreme type events in each scenario (e.g. the price of ductile iron pipe will rise 100% over the course of construction). 4. Create mitigation strategies and tactics for each of the scenarios. 5. Select strategies and potential tactics that address multiple scenario impacts from the mitigation strategies as a way to predict and mute the unpredicted.

Once each of these steps is applied to the non-traditional risks, a utility contractor can develop the most robust set of strategies and tactics in order to better control the risks they face.
In Figure 1.9, risks plotted in the upper left corner are low frequency and high severity type exposures and are titled Hurricanes. Risks plotted in the upper right corner are high frequency and high severity type exposures and are titled Tornados. Risks plotted in the lower left corner are both low frequency and low severity and are titled Water Spouts. The last classification of risks, Thunderstorms, are plotted in the lower right corner and are high frequency and low severity.

Using a structured approach to risk mitigation that includes the Trees and Forest risk assessment is a necessity. This structured approach requires developing mitigation strategies and tactics, primarily from one of four strategic groupings. There are four basic strategies and a series of tactics that can be used to mitigate risk, as seen in (Figure 1.10).

These strategies include the following:
1. Recognize & Ignore
2. Accept & Manage
3. Accept & Transfer
4. Avoid

Leverage may be a fifth strategy to address unique risks, where the risk is treated as a positive and something to take advantage of to generate gain as opposed to mitigate downside.
**Strategy 1: Recognize & Ignore**

This strategy revolves around recognizing an identified risk as a potential threat to success, recording it in the risk log, and taking no action to reduce its frequency and/or impact. Typically, this strategy is appropriate for risks where the severity is perceived as moderate to low. If the risk’s severity is more extreme, avoiding the risk is strategically a better fit. These risks can be very broad, non-traditional, difficult-to-define, and difficult to influence or control. One example might be the risk of a national trade labor strike that impacts the availability of labor on a particular jobsite. Another example might be aging workforce issues impacting availability, productivity, and safety performance. In many instances, these types of risks will not fit well into traditional risk management techniques and are better addressed using the Forest or scenario approach previously described.

**Strategy 2: Accept & Manage**

The accept and manage strategy revolves around accepting the risk as a threat to success, recording it in the risk log, and choosing to manage it internally to reduce its frequency and/or impact. Accept and manage strategies are typically appropriate for risks that are traditional in nature, well-defined (or definable), and the contractor’s ability to influence or control these risks is high. Examples of risks that may fall into this category include estimating accuracy, access to competent and capable project managers, access to an appropriate quantity and quality of skilled craftsman, and increasing commodity demand leading to shortages or price increases, etc.

In each case, the utility contractor would follow the four steps for risks that fall into the Trees category. The third step of the Tree strategy, “Develop mitigation strategies and tactics where contractors, engineers, insurance professionals, and owners work collaboratively to select the most robust risk management approach for each risk: accept and manage, accept and transfer, recognize and ignore, or avoid” is designed to ensure that a robust set of actions are undertaken to control the risk or exposure to the risk.

The example below offers a set of mitigation tactics that were selected by public agencies for the general risks described above. In many instances, a utility contractor can better understand how the customer might respond to a particular risk, which could indicate the most effective approach the utility contractor can implement.
Accept & Manage Risk Examples and Mitigation Tactics

Estimating Accuracy
My capital construction program is at risk due to cost escalation driven by inaccurate estimates or budgets.

Mitigating Tactics
• Use of a standardized approach
• Request a budget increase

Program or Construction Manager Access
My capital construction program is at risk due to an inability to attract qualified program management or construction management resources.

Mitigating Tactics
• Hire or assign internal staff
• Pre-qualify and partner with program management service providers
• Purchase technology/software to capture and display critical information
• Increase frequency of meetings

Skilled Craftsman Availability
My capital construction program is at risk due to an inability to attract qualified construction management practitioners.

Mitigating Tactics
• Pre-qualified and partnered with union locals and/or contractors

Commodity Demand
My capital construction program is at risk due to cost escalation driven by world demand for commodities.

Mitigating Tactics
• Used program-level purchasing power
• Use hedging

Permit Receipt & Timeliness

Mitigating Tactics
• Hire or assign internal staff
• Use of a standardized approach

Performance Bonus Payment

Mitigating Tactics
• Use hedging

Dispute Resolution Techniques

Mitigating Tactics
• Use of a standardized approach
• Hire or assign internal staff

Ultimately, the public agency or utility asset owners and the utility contractors working for these customers are responsible both for identifying and controlling the risks to which the project is subject.

Strategy #3 Accept & Transfer
The strategy of accept and transfer revolves around accepting the risk as a threat to success, recording it in the risk log, and choosing to transfer this risk to an external party to reduce its frequency and/or impact. External party can mean a supplier, service provider, contractor, designer, insurer, etc. It is typical that risks where this strategy is appropriate tend to be risks that are traditional in nature, well-defined (or definable), and the contractor’s ability to influence or control these risks is high. Insurable or bondable risks tend to particularly fall into this category where the use of actuarial techniques allows for highly accurate prediction of frequency and severity over a large historical database of occurrences. Examples of risks that may fall into this category include Design Review Quality & Detail; Design/Construction Team Integration; Construction Firm Quality & Access; Engineer Quality & Access, etc.

In each case, the utility contractor would follow the four steps outlined for risks that fall into the Trees category. The third of these steps, “Develop mitigation strategies and tactics where contractors, engineers, insurance professionals, and owners work collaboratively to select the most robust risk management approach for each risk: accept and manage, accept and transfer, recognize and ignore, or avoid” is designed to ensure that a robust set of actions are undertaken to control the risk or exposure to the risk. The list on page 18 offers a set of example mitigation tactics that were selected by public agencies for the general risks described above. In many instances, a utility contractor can better understand how the customer might respond to a particular risk which informs the most effective approach the utility contractor can implement.
Accept & Transfer Risk Examples and Mitigation Tactics

Design Review Quality & Detail
My capital construction program is at risk due to an inability to control the planned scope of work due to ineffective design reviews.

Mitigating Tactics
- Integrate risk into contracts

Design/Construction Team Integration
My capital construction program is at risk due to cost escalation driven by no or ineffective integration of engineers, contractors and suppliers into planning and pre-design activities.

Mitigating Tactics
- Integrate risk into contracts (e.g. Design/Build Contract)
- Require an equity involvement in project (e.g. P3, Integrated Project Delivery, Concession Model)

Construction Firm Quality & Access
My capital construction program is at risk due to an inability to attract qualified construction contractors.

Mitigating Tactics
- Require an equity involvement in project (e.g., P3, Integrated Project Delivery, Concession Model)

Engineer Quality & Access
My capital construction program is at risk due to an inability to attract qualified engineering resources.

Mitigating Tactics
- Integrate risk into contracts
- Hire a firm with qualified resources

Heavy Equipment Availability

Mitigating Tactics
- Integrate risk into contracts
- Hire a firm with adequate equipment availability

Liquidated Damages Assessment & Collection

Mitigating Tactics
- Integrate risk into contracts
- Require an equity involvement in project (e.g. P3, Integrated Project Delivery, Concession Model)

Ultimately, the public agency or utility asset owners and the utility contractors working for these customers are responsible both for identifying and controlling the risks to which the project is subject.

Strategy 4: Avoid

The avoid strategy revolves around recognizing the risk as a potential threat to success, recording it in the risk log, and taking action to remove the project from exposure to the risk. Risks where this strategy is appropriate tend to be risks where the severity is high to extreme or perceived to be high to extreme. If the perception of the severity is moderate to low, the strategy of recognize and ignore might be more appropriate. In addition, the risks that might fall into the avoid category tend to be very broad, non-traditional, difficult to define, and difficult to influence or control.

In many instances, these types of risks will not fit well into traditional risk management techniques and are better addressed using the “Forest” or scenario approach previously described. Examples of risks that may fall into this category include lack of or ineffective planning techniques; clearing customs; architects’ quality & access; constructability quality & detail, etc.

At the point that a utility contractor might become involved in the project, it is likely that the owner choosing to cancel the project or selecting an alternative project is not possible because the decision to move forward has already been made. If this is the case, one of the previously defined strategies will be more appropriate to help mitigate and control exposure. In any case, the utility contractor would follow the four steps outlined above for risks that fall into the “Trees” category or the five steps outlined above for risks that fall into the “Forest” category. Both approaches include “Develop mitigation strategies...” or tactics designed to ensure that a robust set of actions are undertaken to control the risk or exposure to the risk. The table below offers a set of example mitigation tactics that were selected by public agencies for the example general risks described above. In many instances, utility contractors can better understand how their customers might respond to a particular risk, which informs the most effective approach the utility contractor can implement.

Examples to Avoid Risk and Mitigating Tactics

No or Ineffective Planning Techniques
My capital construction program is at risk due to an inability to meet schedule completion date due to no or ineffective use of pre-project, resource, and short-interval planning techniques.
Mitigation Tactics
• Delay or adjust project timing
• Cancel the project
• Select an alternative project

Clearing Customs
My capital construction program is at risk due to an inability to meet schedule completion date due to clearing speed of foreign produced equipment, material or supplies.

Mitigation Tactics
• Delay or adjust project timing

Architects Quality & Access
My capital construction program is at risk due to an inability to attract qualified architectural resources.

Mitigation Tactics
• Select an alternative scope
• Select an alternative project

Constructability Quality & Detail
My capital construction program is at risk due to an inability to control the planned scope of work due to ineffective constructability review use.

Mitigation Tactics
• Select an alternative scope
• Select an alternative project

Ultimately, the public agency or utility asset owners and the utility contractors working for these customers are responsible both for identifying and controlling the risks to which the project is subject.

Strategy 5: Avoid
The last of the strategies can only be applied in unique instances where a profitable or positive outcome can be achieved by effectively controlling or mitigating the risk as opposed to only mitigating downside is Leverage. The fact that these unique risks can generate a positive outcome does not mean they should be excluded from the risk log as the same set of “Trees” or “Forest” steps would be applied to these risks in order to attempt to generate the leverage available.

One example might be the risk of an early completion that in the case of a water or sewer pipeline could result in the earlier systems or line startup. Another example might be commodity price improvement that results in lower material cost and consequently a lower total construction cost that can be translated into an increase in scope that is paid for through the savings generated in another area. Ultimately, the utility asset owners and utility contractors are responsible both for identifying and controlling these upside risks to which the project is subject using the same set of tools and techniques described previously.

Risk Implement/Control
For each individual risk identified and recorded in the risk log (See Part I, Spring 2018), one of the four or five potential strategies should be selected to manage this risk, and where appropriate, a set of tactics for implementation and control of each risk. The three-leg stool example is based upon the balancing of insurance, contract language, and claims management techniques in order to achieve effective

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risk management. The process steps of identify, analyze, mitigate, are followed by the effective implementation and control through both traditional (“Trees”) and non-traditional (“Forest”) management techniques. This implementation and control is the ultimate responsibility of the power plant construction manager.

Projects do not spontaneously fail. There is always a trail that leads back to unrealized risk, misunderstood risk, or unmanaged risk that are a root cause of project failure.

** Routinely Discuss Risk Management In Project Planning and Execution **

At the end of the day, the most immense and severe impacts to capital construction programs are unpredicted (but not unpredictable), infrequent events that happen with greater regularity than anticipated. Unfortunately, history takes the sharp edges off these types of events that have devastated construction projects, compelling practitioners to underestimate the probability that they will occur.

Innovative agencies or owners in the utility space and innovative utility contractors working for these customers creating highly engaged capital construction teams are injecting risk management discussions routinely into their capital planning and execution process. These efforts are yielding more successful projects. This type of assertiveness is necessary across the industry and unfortunately, too rare. The pace of change, design challenges, and financial complexity makes the process of capital construction higher risk and more challenging even for the most sophisticated owners.

More can be done and we believe that the most successful utility contractors will move “beyond the bell curve” in risk management of their projects. These efforts will recognize and take into account the following:

- History is less applicable today because complexity is changing the nature of capital construction.
- The most immense and severe impacts to capital construction programs are unpredicted, one-time events.
- “Black Swan”-type events will take place and recognizing their range of impact is more critical than attempting to predict when they might occur.
- Work to specifically avoid underestimating the impact and likelihood of improbable events and understanding the nature of more frequent risks.
- Focus on the “Forest” as the source of the most devastating risks while managing the “Trees” which are easier to see and discuss.

** FOOTNOTES **


2. Proprietary analysis by Continuum Capital of data provided from CMAA and collected as part of the preparation of the report, Beyond the Bell Curve: A Report on Managing Capital Project Risk, CMAA Ninth Annual Survey of Owners, pg. 8.

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