ARCADIS Design & Consultancy for natural and built assets

"Control of Project Risk for Owners"

Chris Carson, CCM, PMP, PSP
Director of Program and Project Controls, Arcadis U.S., Inc.

Executive Summary

Maximum and most effective control of Owner's project risk requires a risk planning and management culture integral to the project controls disciplines of cost and time management. There is no simple one-step process, but rather a proactive and planned effort. The approach includes special attention to specific high-risk areas of construction management including scope definition, type of contract, contractual language used in the contract, the choice of project delivery method, the change management process, the quality and experience of the CM team, the procurement process, an integrated cost and schedule management approach using risk workshops to provide high value input into the program. Success correlates with collaboration among the full construction team, and a strong integrated cost/schedule/risk approach improves collaboration.

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Background

Owner risk tolerance is a necessary discussion as an integral part of planning a project or program. Understanding the level of tolerance is vital to several of the tasks in the planning effort. Risk can and should be addressed in the scope definition, in the contract type, in the contractual language, in the choice of project delivery method, in the change management process, in the quality and experience of the management staff, in the procurement process, in the integrated risk/schedule and in the implementation of the plan. Types of risk run the gamut from cost to schedule to political to performance risk, and each can be dealt with differently in the planning effort to ensure the appropriate risk assignment and acceptance for each Owner.

The Construction Management Association of America (CMAA) notes that in the best interest of the project, risk should be assigned to the party most capable of managing the risk. This requires a constant evaluation of the ability of each party to manage the risk, and alignment with the risk under review.

Scope Definition

This is the first decision that should be made by any Owner but is routinely ignored or minimized, partly because it is driven by the investment in design services. The level of scope definition directly affects the level of risk for any given project. Therefore, professional and experienced estimators recommend contingencies that can be reduced as the maturity of the scope definition is improved. Weak contingency estimating and misuse account for a significant percentage of claims, which are failures in properly assigning and managing project risk. The reasons for these failures often relate to failure to understand the level of scope definition at the time of procurement. There is a wide range of levels of scope definition based on the contract with the designer, and again with the quality of the final design as disseminated to the Contractors at bid and procurement stages.

The Association for the Advancement of Cost Engineering (AACE) International, a project controls and cost engineering professional association, notes the maturity of scope definition is aligned with the level of accuracy of the cost estimate, as well as the appropriate usage of the schedule based on the degree of project definition.

The table below, Figure 1, shows the suggested Estimate Classes and the associated Maturity Level of Project Definition Deliverables aligned with the Methodology and Expected Accuracy Range. The accuracy range speaks directly to the risk associated with the cost estimate; the tighter the accuracy range, the lower the risk of meeting that cost. The accuracy range also demonstrates the benefits for probabilistic risk assessment that help ensure better understanding of the potential consequences of the decisions.[i]

When the culture accepts that an estimate provided at 30% scope definition cannot be accurate to within +/- 5%, the Owner is better protected recognizing that the budget estimate at 30% scope definition is more appropriately considered as a -10% / +40% range of accuracy. This ensures that the estimate aligns with the scope maturity and the ability of the estimator to use appropriate tools to estimate the work.

	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical +/- range relative to index of 1 (i.e. Class 1 estimate) [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Screening or feasibility	Stochastic (factors and/or models) or judgment	4 to 20	1
Class 4	1% to 15%	Concept study or feasibility	Primarily stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget authorization or control	Mixed but primarily stochastic	2 to 6	3 to 10
Class 2	30% to 75%	Control or bid/tender	Primarily deterministic	1 to 3	5 to 20
Class 1	65% to 100%	Check estimate or bid/tender	Deterministic	1	10 to 100

Notes: [a] If the range index value of "1" represents +10/-5%, then an index value of 10 represents +100/-50%.
[b] If the cost index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%.

Figure 1 - Cost Estimate Classification Matrix for Construction from AACE RP No. 17R-03[ii]

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Figure 2 - Cost Estimate Classification Matrix for Process Industries from AACE RP No. 18R-97[iii]

Capturing the full scope definition requires an appropriate and reasonable schedule and allows adequate time to support building in quality instead of inspecting quality. Finishing a project on time using the right schedule will help minimize risks and reduce cost overruns. This is part of the AACE's Total Cost Management philosophy and classifying schedules like cost estimates aligned with the typical Phases and Stage-Gates defines the project life-cycle.

AACE Recommended Practice No. 27R-03, "Schedule Classification System", provides these schedule classes designations and shows how they align with project scope definition maturity. From this RP, Figure 2 below addresses how the scheduling methods achieve reasonable project duration and planning dates while covering scope definition maturity.

	Primary Characteristic	*Secondary Characteristic*	
SCHEDULE CLASS	**DEGREE OF PROJECT DEFINITION (Expressed as % of complete definition)** [1]	**END USAGE**	**SCHEDULING METHODS USED**
Class 5	0% to 2%	Concept screening	Top down planning using high level milestones and key project events.
Class 4	1% to 15%	Feasibility study	Top down planning using high level milestones and key project events. Semi-detailed.
Class 3	10% to 40%	Budget, authorization, or control	"Package" top down planning using key events. Semi-detailed.
Class 2	30% to 70%	Control or bid/tender	Bottom up planning. Detailed.
Class 1	70% to 100%	Bid/tender	Bottom up planning. Detailed.

Figure 3 - Schedule Classification Matrix - From AACE RP No. 27R-03[iv]

Lessons learned from forensic analysis of disputes and industry studies show that the largest risks to project success lie in the scheduling effort, the cost estimating effort, and the failure to use risk management processes to ensure appropriate budgets and project durations. In fact, risks from schedule, cost, and risk are twice as serious to project success as technical, design, and engineering issues.[v]

Contract Type

Contracts are primarily either Fixed Price (Stipulated Sum) or Cost Reimbursable formats. There are some variations such as Guaranteed Maximum Price (GMP), Cost Plus Fee, Unit Price, Fixed Price with Incentives, or combinations of these alternates. Allocation of risk is determined by the type of contract,

with fixed price contracts shifting performance risk to the Contractor and cost reimbursable contracts accepting risk by the Owner.

With fixed price contracts, there must be adequate competition in order to make the proposals effective, and cost and pricing information must be available. The Contractor in a fixed price contract will accept a price which represents assumptions of a reasonable apportionment of risk. This means that the Contractor must be able to estimate uncertainties in contract performance, as well as fully understand the contract scope. Less than fully mature scope definition in drawings will increase costs at bid and increase change management efforts, resulting in higher change costs.

Cost reimbursable contracts are used when the uncertainties of performance do not allow accurate costs to be developed and use of a fixed price contract would yield very high bids. These contracts place the bulk of the risk on the Owner and should only be used in specific cases, especially since there is little incentive for the Contractor to control costs. When used, the Owner should recognize that minimizing cost and time overruns require careful documentation of actual cost and time, daily if possible. This approach will limit the ability of contractors to confuse time spent on original contract work with time spent on the additional T&M scope.

One of the places where Owners assume unintended risk is in the change management process during design and construction. The goal of change management should be to place the Owner and Contractor back in the same risk profile as the original contract dictated, however, when change management is not handled in a timely and effective way, the Owner often assumes additional risk. The solution to this is to prepare accurate estimates and time impact analyses that can be used to negotiate change orders, including, legitimate time extensions, as early as possible. This timely approach to change management reduces the owner assumption of performance risk, avoids claims such as constructive acceleration, and keeps the schedule as a good model of project status, capable of use in analysis of delays.

Contractual Language

There are a variety of approaches to limit or shift risk in the contract, regardless of the project delivery method or contract type. These approaches are defined in the contractual language and can affect risk for time and costs.

Time risk assignments occur with language to limit or assign ownership of project float, which is generally Total Float. Delays which would be compensable to the Contractor must occur on the Critical Path of activities which control the project duration, so these are typically zero float activities. Since it is possible to assign the ownership of float, the Owner can take this ownership and limit the ability of the Contractor to earn extensions of time. The quality of the schedule is a significant factor in management of float, and that requires a high level of technical schedule review, in the baseline and all updates.

When the contract is silent with respect to float ownership, in most states the float is owned by the project and shared by Owner and Contractor. The Owner must manage this issue by protecting against a Contractor using up all available float for an Owner to discover that there is a change order needed which would then be compensable. Careful schedule review and monitoring to ensure that float is accurately calculated and reported is essential in protecting against this risk.

Another place where Owners can protect themselves against performance risks is by using language to limit or prevent the possibility of a Contractor pursuing a compensable extension of time based on an early completion schedule. Case law suggests that a Contractor has a right to finish early, so if he bids a project and reduces the costs by planning to finish in less time than the contractual completion date (CCD), he could earn extended general conditions if the Owner causes a delay beyond the Contractor's early completion date and the CCD. There are a number of clauses that protect against the Contractor's early completion schedule and leave flexibility in the schedule for Owner needs. This is especially important if the Owner cannot take occupancy of the project earlier than the CCD, which can often be the case.

The subject of notice from the Contractor to the Owner about alleged delays is another place where risk can be controlled. Contract language requiring the Contractor to provide formal, written notice of any delay will limit the risk of large change orders that come as a surprise to the Owner with the late discovery limiting the ability of the Owner to participate in mitigation decisions and actions. This language often defines failure to provide sufficient or timely notice as a waiver of rights to make a claim. Waivers can show up in change order requests either as contractual language related to required processes to perfect a change request, and if the Contractor breeches those requirements, can lose entitlement to the additional costs and time involved in the change.

A risk shifting approach that Contractors often use is a reservation of rights provided with change orders. This is an attempt to keep options open for future claims of indirect, consequential and/or cumulative disruption costs and time impacts. This approach can alter change order language that otherwise notes that the change order settles all cost and time claims associated with the issue. If the goal is to maintain the assignment of performance risk to the Contractor in the original contract, reservation of rights can move the risk of performance over to the Owner during change order negotiations and resolution.

Another set of risk shifting language is that of exculpatory contract clauses, sometimes called disclaimers, which attempt to absolve responsibility for damages from future or unknown circumstances. This is a way to shift undetermined risk to the Contractor from issues like third-party uncontrolled risks. It also occurs in existing conditions such as geotechnical reports and Owner limitations for information only or differing site conditions. These can also be pay when paid or indemnity clauses, all of which require experienced legal support to provide maximum value in the use.

The last set of risk shifting language is that of the no damages for delay, and this limits delay entitlement to time only. It is important when using this type of language to ensure that no exemptions to no damages for delay are created by interference by the Owner, bad faith, or delays that just were not contemplated. But no damages for delay clauses shift risk to the Contractors who do not have the ability to control that risk, so the use of this approach tends to increase the costs and detracts from the collaborative construction team effort that is most effective.

Choice of Project Delivery Method

There are four basic project delivery methods, Design-Bid-Build (DBB), Design-Build (DB), Construction Management at Risk (CMAR), and Integrated Project Delivery (IPD), as well as several variations of these methods. Each method carries a different level of risk for the owner, and this is related to the amount

of control that the Owner accepts over the project. Risk and control are inversely related so one way to reduce risk is to choose a project delivery method that lowers Owner's risk but also gives up more Owner's control.

This risk profile is illustrated in a CMAA chart shown in Figure 2 below, which lists the range for Public-Private-Partnerships (P3), a similar delivery method as DB except for financing and operations by the Contractor, DB, DBB, CMAR, and Multiple Prime contracts, which place the risk of contract coordination onto the Owner.

Figure 4 - Project Delivery Methods - Risk and Control[vi]

The choice of project delivery method also depends on the level of scope definition. A DBB project cannot be utilized if the scope definition is not very mature or change management will exceed contingencies for time and budget. On the other end of the scale, attempting to provide too complete of a scope definition for a PPP project will reduce flexibility and limit the innovation freedom to control risks that is at the very heart of this type of delivery.

Each type of project delivery method has risks that must be managed to ensure success. For example, in the CMAR delivery, establishing a detailed preliminary budget, a formal stage-gate approach to cost/schedule/risk during design development, and correlation with each evolving budget and the award letters to the preliminary budget, all promote the "design-to-cost" effort and allow for a reasonable and achievable final guaranteed maximum price when the CMAR becomes a General Contractor and takes on full performance risk. Without serious controls in place to evaluate the CMAR budgets and schedule, and without ensuring the competitiveness and accuracy of the award of subcontracts, the project can start out by draining the Owner's contingencies, only to discover that there are huge savings which might be split after final audits. That ties up contingency monies that should have been drawn down for the Owner's benefit and returns it too late for the project but ensures the Contractor makes their additional fee.

Change Management Process

A planned and well-managed change management process is very important to managing and minimizing risk for a successful project. Planning for change management starts with a careful definition

of changes, establishing the types of change so appropriate funding planning can be provided. Some changes are issues that occur in most projects, such as unforeseen conditions, and some are issues that cannot be easily anticipated, such as scope changes by end-users. Planning for defined categories of changes allows alignment between categories and funding.

After all, that is the real root of the matter, if legitimate change happens and there is a fund set up to accommodate the change, there is no impact to the project. Once the categories of change are established (and many contracts as well as AACE RPs offer definitions), it is possible to plan for how to fund the changes when they occur. Looking at two broad funding approaches, Contingency and Management Reserves, the difference in the use is that Contingency is intended to be used for changes that are expected to happen even if the extent is not known, and Management Reserves are intended to fund scope requests that are not included in the original scope description, and hence the budget, from the Owner, End-User, A/E.

AACE defines Contingency, in the Cost Engineering Terminology RP, as "*An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs*."[vii] Contingency does not include major scope changes, Force Majeure events, management reserves, escalation and currency changes.

Contingency can be carried in the original budget, and during the Stage-Gate process of Project Controls, can be subdivided into specific categories such as Design Contingency, Estimating Contingency, Procurement Contingency, Construction Contingency. Note that not all contingency funding is due to specific risk events, some is needed for accommodating the standard of care in the construction process, from design to estimating to construction. There is some level of design errors and omissions that falls outside the industry standard of care which recognizes that scope definition in the way of plans and specifications cannot be perfect. This is part of the purpose of Contingency.

AACE defines Management Reserves, in the Cost Engineering Terminology RP, as "*An amount added to an estimate to allow for discretionary management purposes outside of the defined scope of the project, as otherwise estimated*." This is where an Owner would normally fund the items not included in Contingency, such as scope change. Management Reserves would typically be carried outside the project, and managed by the Program Manager or Owner, not the Project CM team. The better the definition of these terms, the easier it is to manage and account for change orders.

Estimating Management Reserves is more difficult than Contingency because this fund is designed to cover unknowns such as improvements in technology that might interest the end user to upgrade equipment that was specified in the original scope definition, is still sufficient, but not the most desired technology.

Contingency and Management Reserves cover the risks that can be planned, but a robust Change Management effort during design, procurement, and construction is important to control these risks. Use of a formal Stage-Gate process during the design phase is vital to supporting "design-to-budget" efforts. Use of a thorough review and evaluation of the procurement process improves the selection of contractors and suppliers and correlating the procurement basis to the budget and schedule helps ensure adequate time and money. Use of a robust Change Management effort during construction ensures that original contract scope is provided, that Contingency is drawn down appropriately and according to the relief of risks, and Management Reserves are used appropriately.

When it comes to change management for an existing project, providing accurate AACE Class 2 or Class 1 estimates for changed conditions is vital to evaluate the costs. Without the ability to discuss specific quantities and unit costs for changes, the Owner is at a huge disadvantage, and in negotiations, it is common to find that the subcontract portion of the general contractor's estimate that is poorly documented will be reduced in the face of a detailed check estimate. In addition, when there is a time impact from a changed condition or delay, the costs for the extended general conditions when the project is truly prolonged can be a large part of the total change order. This makes it imperative that a good process to develop independent Time Impact Analyses (TIA) in order to evaluate the contractor's TIAs, and armed with this independent evaluation, the negotiations are quicker and easier.

Once a delay or impact event has been identified, prior to absorbing the delay into the schedule and project, the goal should be to quickly move the Owner back to the original risk allocation strategy from the contract, which is usually assigning the cost and time performance to the contractor. This requires negotiating any extensions of time (EoT) that the contractor is entitled to received after careful analysis to validate the request or need. Issuing the proper EoT in a timely fashion fulfills the need to allocate the risk properly and eliminates the risk of constructive acceleration to the project. Owners are at risk of turning non-compensable time extensions into compensable acceleration efforts simply by not awarding legitimate EoTs as they are earned.

Control of risks from change is dependent on this full Change Management process being implemented competently in order to ensure scope is defined and the increasing maturity of scope definition is monitored to enable the ability to "design-to-budget".

CII (Construction Industry Institute) ran a research project "to evaluate the level of engineering **maturity** needed at Project Authorization, but also the **accuracy** of these engineering deliverables." This Front End Engineering Design process is shown in the graphic below, which indicates the Gate 3 which cannot be opened to release further design development until the process yields the appropriate maturity and accuracy of the design.

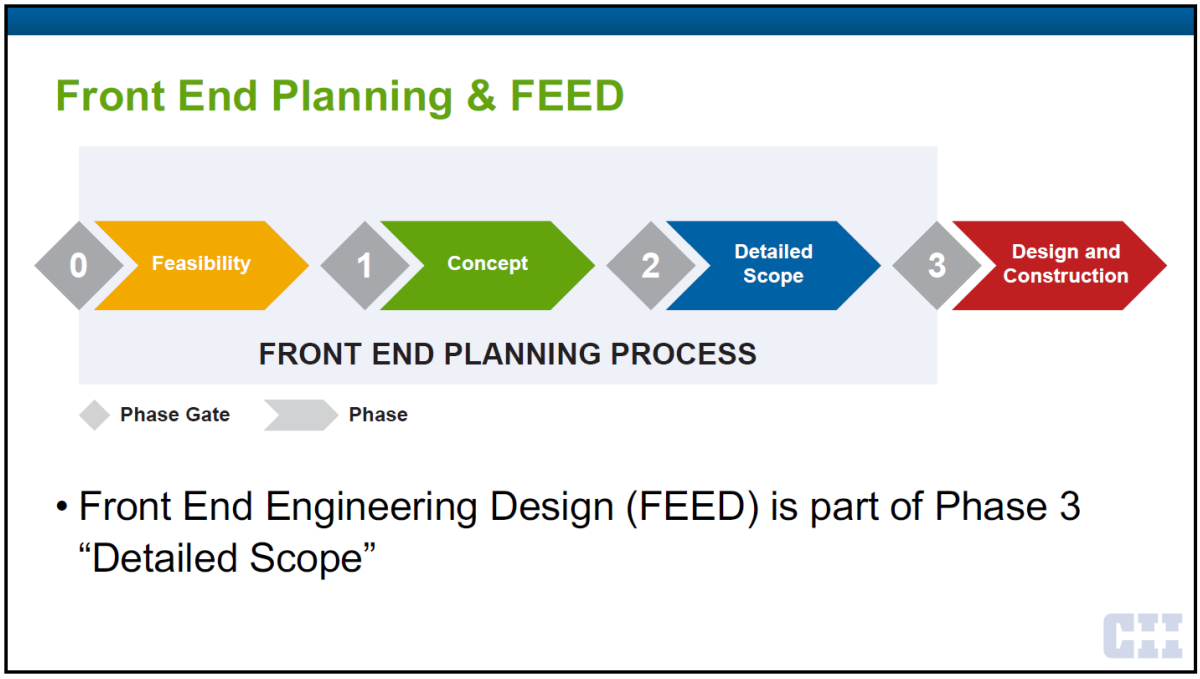


Figure 5 - Front End Engineering Design Process (CII)[viii]

With **maturity** addressing the degree of completeness and **accuracy** addressing the degree of confidence in the measure of maturity, the research project developed a tool to be used to assess the maturity vs. accuracy. found a 24% cost difference between "High Maturity High Accuracy and Low Maturity Low Accuracy Front End Engineering Design".

The tool was used to assess 11 projects of over $5.1B construction value in the survey, ranging from chemical plants to a storage facility, and yielded the 24% cost difference in the summary shown below:

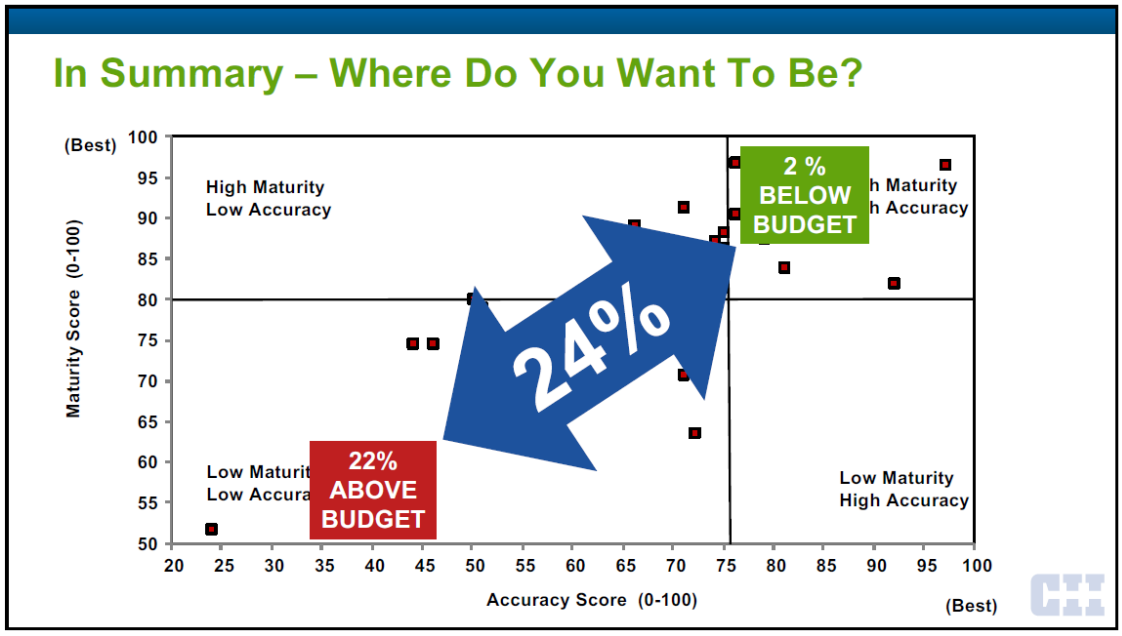


Figure 6 - Study Summary Cost Difference (CII)[ix]

Quality and Experience of the Construction Management Team

Managing risk starts with pre-planning and must be at the forefront of management throughout the construction project. Shallow efforts to develop initial risk management plans without a very experienced team to support and implement the plan will result in dusty risk management plans sitting on shelves providing no value.

While risk is a common buzzword, few stakeholders in projects have a strong depth of understanding of risk and the risk processes. Risk must be integrated into the construction management processes, and the CM staff should be well versed in risk principles and implementation.

Experience in risk management is very important to anticipate the typical problems that occur and bring the lessons learned from previous projects to the planning of each new project. Lessons learned can come from project experience but also from claims and dispute resolution experience. In fact, since claims result from failures in risk management, these lessons are often more valuable than project

lessons. Engaging in forensic schedule and cost analysis requires a deep understanding of CPM scheduling, forensic analysis methodologies, negotiations skills, and cost and time legal principles. The experiences of reviewing schedules and documentation to determine what happened to cause delays, determine the quantum of delay, examine entitlement and liability, and place responsibility for delays, all contribute to a much better understanding of project risk and how to control it. This means that CM team members who have forensic analysis and dispute resolution are much more competent to manage risk during the project life-cycle. Involvement in Industry association publications such as the AACE's Recommended Practice 29R-03, "Forensic Schedule Analysis" is valuable, this is probably the best explanation and taxonomy of methodologies used to analysis and resolve disputes. Lessons learned during development of these types of industry best practices are invaluable in predicting risks and mitigating to avoid cost and time overruns.

While few academic programs include knowledge of risk management as a prerequisite for a professional degree, there are professional certifications that support understanding of risk. At the construction/project management level, the Project Management Institute (PMI) includes risk management as one of the knowledge areas, so a Project Management Professional (PMP) certification would indicate exposure to risk on project work, not specifically construction projects, but still project risk. The Construction Management Association of America (CMAA) offers the Certified Construction Manager (CCM) certification and the CMAA Standards of Practice as taught for the CCM fully integrate risk into the CM processes, and these are specifically for construction projects.

When it comes to specialization in risk management, there are two primary industry risk certifications; the Risk Management Professional (PMI-RMP) by PMI and the Decision and Risk Management Professional (DRMP) by AACE International. Once again, the PMI-RMP is not specifically designed for construction as is the DRMP but the general risk processes are the same regardless of industry. AACE believes that it is not possible to separate decision and risk so both need to be taught and certified.

Since control of risk to the Owner involves cost and time, it is important that an integrated effort of cost and schedule risk management is undertaken, which elevates the value of the cost and schedule certifications. For construction projects, the PMP is useful but the CCM is invaluable as it addresses these areas. Specialization in cost and time certifications is important for CM staff to support risk control for Owners, and AACE International is the best of the industry associations that issue these certifications. The Certified Cost Professional (CCP) is a generic certification which provides a good overview background in time, cost, and risk, offered by AACE. Cost estimators can earn the Cost Estimating Professional (CEP) and schedulers can earn the Planning & Scheduling Professional (PSP) certifications, both of which demonstrate a detailed understanding and experience in cost and time. The largest risks to project success are related to cost, time, and risk itself, as demonstrated below:

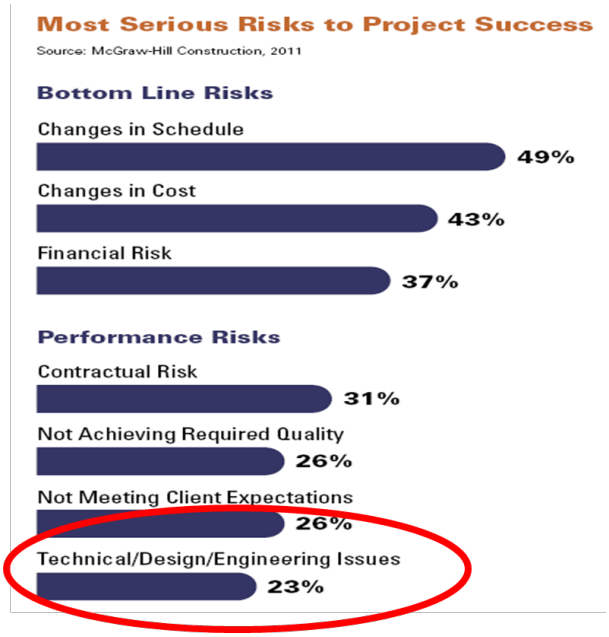


Figure 7 - Risks to Project Success[x]

While part of the value of industry professional associations includes CM professionals earning industry certifications, a greater part of the value is the engagement in these associations by writing and presenting papers on various cost, scheduling, and risk topics. This engagement takes a CM professional from an expert in these fields to an industry thought leader. At this level, the professional has taken the lead in innovative approaches to managing risk and has defended those approaches from industry constructive criticism, improving the approach.

Procurement Process

Once the contract type and project delivery methods are chosen, and the appropriate risk assignment language has been selected, it is vital that the procurement process is managed with an eye to limiting risk. Many disputes start with a breakdown in procurement.

A quality check on the procurement is to evaluate the number of questions or requests for information that result from Contractors starting their cost estimate. If there are large numbers of questions, the documents do not convey the appropriate scope definition and the project contingency is likely too low as the result will be an increase in change requests. A careful evaluation of the bidders, including trade and general conditions comparisons, is vital to ensure appropriate awards. Lessons learned from claims shows that a frequent problem with projects that had cost and time overruns was an inappropriate award to the “low” bidder. This can be due to insufficient general conditions, unbalanced subcontract trade bids, inappropriate project duration estimate, missing scope, and inadequate or lack of contingency.

Constructability reviews, value planning and engineering, along with better designer quality control of documents, are valuable mechanisms to reduce risk to the Owner. Owner risk is enhanced since these same defects in scope definition will generally raise the bids from the Contractors attempting to limit their risk.

Integrated Cost and Schedule Management

Risk control attempts to predominantly avoid cost and time losses, and while these are discussed separately, they should be managed in an integrated approach with risk management. Early risk assessment identifies project or program risk issues that can then be monitored and controlled. This can start with identifying cost and risk drivers during value planning and monitoring those drivers throughout the stages of cost and schedule development in conjunction with scope definition development. Risk-based approaches to determine appropriate contingency and management reserve are probabilistic and deterministic, and support risk control for an Owner. AACE has a number of excellent Recommended Practices for determination of cost and time contingency, from range estimating to expected value approaches, as well as those for integrated cost and schedule risk analysis.

Then as soon as a preliminary schedule is developed that shows a reasonable level of detail and full scope, an integrated cost and schedule risk management effort can be facilitated. From simple qualitative risk assessment of risk drivers to comprehensive quantitative risk assessment looking at risk drivers as well as uncertain durations and what-if scenarios for conditional branching risks (acceptance of one risk can cause new conditions that branch out into new risk directions), all risk approaches bring value to the process of managing Owner's risk.

While it is possible to provide schedule risk management as a stand-alone effort, it is not useful to attempt to provide cost risk management with considering the schedule as schedule is a significant risk driver for cost. The integrated cost-schedule approach to risk assessment provides the most valuable results.

Use of Risk Workshops to Identify and Manage Risk

Risk workshops range from simple one day efforts to multi-day, multi-meeting workshops, and all efforts add value to the process, improving the control of risk. A qualitative integrated cost-schedule risk workshop designed to identify and manage risk drivers will capture the combined experience and lessons learned of all the participants in the workshop. Facilitated properly, this workshop will allow the participants to identify all risks, prioritize the risks based on probability and consequence, and write response plans that have the effect of removing the highest priority risks from the schedule and project. These risk removal efforts include time-based practical steps developed by the CM team based on their experience. The deliverables from the workshop also start the risk monitoring effort which keeps risks and risk monitoring at the forefront of project discussions. Awareness of potential risks and review of them at the time of inception will allow proactive actions to minimize or mitigate the risk impacts.

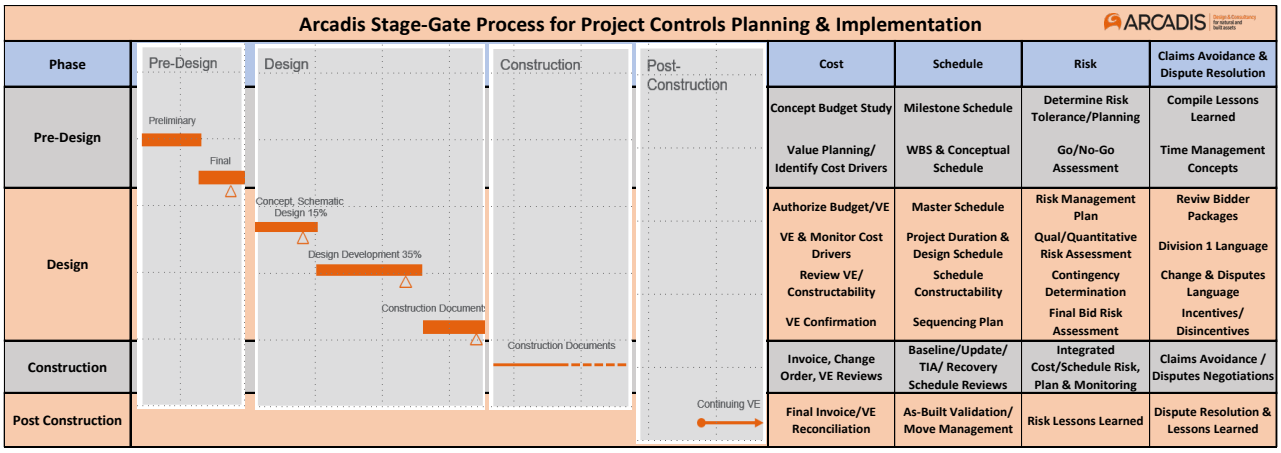
In addition to the value from the risk management, these workshops help to establish a partnering or collaborative approach to construction management, which has proven to drastically improve performance and reduce claims.

Implementation of the Plan

The best way to manage Owner risk is to develop the risk management plan early in the pre-project phase looking at systemic risks and major risk drivers, update it during design phases developing and monitoring project risks, and allow it to evolve into the full integrated cost-schedule risk management

plan, and use the output or deliverables from each stage to manage the next stage. Accurate cost estimates with appropriate contingencies, developed at the appropriate level of accuracy, integrated with the evolving schedules, starts the project with the right benchmarks to monitor. With preliminary schedules established, a strong risk workshop enables the CM team to identify the likely risks, eliminate the highest priority risks by the risk response plan, and then monitor the ongoing risks to avoid or mitigate those risks during the project.

This approach takes advantage of the combined experience of the CM team and embraces risk as an integral part of the CM process such that it informs the team and helps shape the approach to managing Owner risk. These project controls discipline tasks are represented in the table below, aligned with the project phases:



Phase	Cost	Schedule	Risk	Claims Avoidance & Dispute Resolution
Pre-Design	Concept Budget Study Value Planning/ Identify Cost Drivers	Milestone Schedule WBS & Conceptual Schedule	Determine Risk Tolerance/Planning Go/No-Go Assessment	Compile Lessons Learned Time Management Concepts
Design	Authorize Budget/VE VE & Monitor Cost Drivers Review VE/ Constructability VE Confirmation	Master Schedule Project Duration & Design Schedule Schedule Constructability Sequencing Plan	Risk Management Plan Qual/Quantitative Risk Assessment Contingency Determination Final Bid Risk Assessment	Reviw Bidder Packages Division 1 Language Change & Disputes Language Incentives/ Disincentives
Construction	Invoice, Change Order, VE Reviews	Baseline/Update/ TIA/ Recovery Schedule Reviews	Integrated Cost/Schedule Risk, Plan & Monitoring	Claims Avoidance / Disputes Negotiations
Post Construction	Final Invoice/VE Reconciliation	As-Built Validation/ Move Management	Risk Lessons Learned	Dispute Resolution & Lessons Learned

Figure 8 - Project Controls Discipline Stage-Gate Services Per Phase

Conclusion

Control of Owner risks is not a universal one-step panacea, but rather an integrated program of cost and schedule risk management that starts pre-project and does not end until all outstanding issues are resolved with the project complete. For the most effective control of Owner risk, the risk management process cannot be a one-time effort or a casual approach, but an integrated cost/schedule/risk culture embedded in the construction management process.

List of Figures

References

[i] Association for the Advancement of Cost Engineering (AACE) International RP No. 40R-08, "Contingency Estimating – General Principles", Rev. June 25, 2008.

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