

Systemic Challenges in Construction: Change is the Only Constant

Alexia Nalewaik, CCE MRICS

Principal, QS Requin Corporation

2450 N. Lake Ave. #335, Altadena, CA 91001

alexian@qsrequin.com

(213) 399-1373 Fax: (626) 794-5312



www.e-builder.net

Integrated Capital Program and
Project Management Software

Introduction

Defining Change1

Managing Change2

Forecasting and Risk Analysis3

Managing Change Orders and Claims4

Using Contingency5

Reporting6

Conclusion6

Bibliography7

Introduction

“It is change, continuing change, inevitable change that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be.” (Isaac Asimov)

Scientists, numerous philosophers, and project managers have long struggled with the concept of change. Yet, changes remain the most prevalent source of disagreement during the construction lifecycle. This paper discusses change management as an organizational objective, with a focus on tools to address and focus efforts on impacts to the scope, schedule, quality and cost of the project.

Defining Change

What is change? The word itself, as a verb or noun, has a diverse set of meanings which appear to defy their incorporation into a solitary definition for construction project purposes. To simplify the concept, if a project or contractual scope of work has changed, it has in some manner been made different or undergone transformation that would not have occurred without interference. Change is here defined for the purposes of this discourse as any activity or decision that alters the course of the project; it is a variation or deviation from plan. That variation can be positive (a benefit to the project or a party to the contract) or negative.

Throughout history, change has been recognized as a universal environmental constant that impacts all human activity and also affects the physical plane of existence. “The contemporary view is that change is a natural phenomenon and therefore must be acknowledged and managed.” (Owens & Martin, 1988)

Countless construction projects validate that philosophy, as projects rarely progress precisely as anticipated. Project change must be acknowledged and managed; it cannot be ignored.

Modern philosophy and change theory posit that change is inevitable, while supporting the concept that change can be controlled and even avoided. Tarot cards, long used as a tool to interpret or divine the future, are not absolute in their predictions – the reading is typically construed as the likely future outcome if the current path is continued undisturbed. The future can be changed and risks potentially averted by taking immediate appropriate action. Then again, taking action may surface secondary risks that are more serious than the first. Risk exists, whether action is taken or not. Risk and change are forever linked in an intricate dynamic.

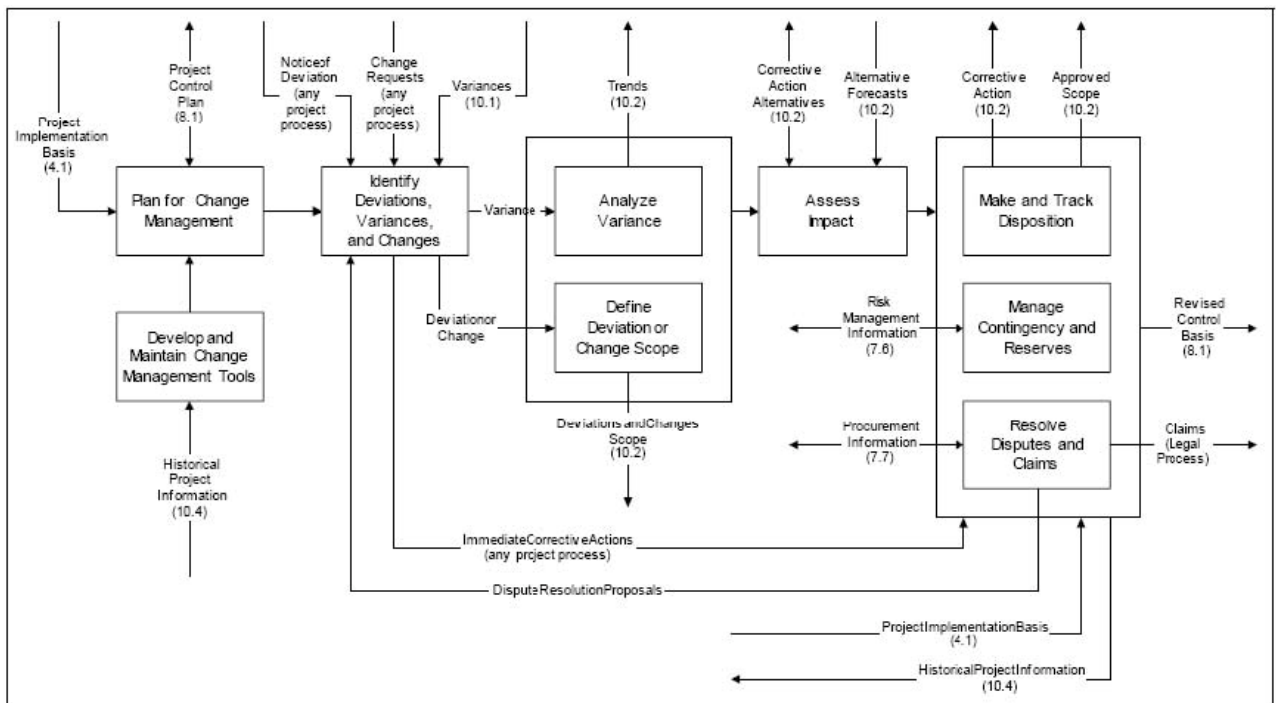
It is important to remember that change does not occur without some impetus. According to the Construction Industry Institute (CII), “Project changes are the most common source of disruption, disagreement, dissatisfaction, and litigation among participants on a project.” This is due to the nature of the industry. In construction, the parties to the contract each have their distinct motives and seek to meet their respective goals. These objectives can be assigned a monetary value. “From economic exchange theory perspective, parties to a construction contract ... seek to satisfy their interests.” (Adams, 1965; Williamson, 1979) On the Owner’s side, lower construction expenditures and a shorter schedule mean a faster return on investment. On the Contractor’s side, a higher contract value or longer schedule may provide a higher margin of profit. These differing interests create a high potential for conflict.

Change is ...any activity or decision that alters the course of the project; it is a variation or deviation from the plan. That variation can be positive or negative.

Managing Change

In an environment where change can be expected and even anticipated, change management and contract administration methodologies become the primary defense. “Planning for change must become an organizational objective.” (Owens & Martin, 1988) The team needs to develop a change management methodology that defines the steps to be taken as soon as a potential change is identified. The change management plan should provide controls, enable project performance monitoring, and facilitate a risk mitigation strategy. “A change management system is a collection of formal, documented procedures that define the steps by which official project documents may be changed. It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes.” (Kumar, 2000) Implemented as both written processes and an electronic database, a change management methodology is intended to provide decisionmakers with the information and controls they need to manage change and take corrective action to keep the project on track. Change management is one function of project controls.

The following figure depicts a process map for change management (AACE International, 2006):



The illustration above comes from the AACE International Total Cost Management (TCM) Framework, a series of structured, annotated process maps that represent a systematic approach to managing the different phases of an asset’s lifecycle, and the relationship of project controls to other project management practice areas and overall business strategies.

There is no one ‘perfect’ change management philosophy, no single methodology for developing checklists and forms to manage change. The project controls processes themselves are typically determined by existing policies and procedures within the organization, and the application of current industry best practices. The type of software implemented will have a distinctive effect on the processes. “Good change processes provide visibility, provide decision makers an opportunity to manage their potential impact, don’t unnecessarily constrain authorized staff from taking action and significantly improve the ability to forecast.” (Baar & Jacobson, 2004)

Some possible benefits of implementing a change management system include:

- providing an audit trail
- improving recordkeeping
- determining the causes of change
- documenting progress
- creating a foundation for claims management
- developing action plans that anticipate change
- providing a consistent methodology for change order review
- establishing a cost and schedule baseline
- increasing early visibility of changes
- improving the team's ability to forecast
- assigning accountability for changes
- capturing lessons learned

It is important to have change management and claims procedures agreed to by all parties as contractual requirements, establishing expectations for documentation, reporting, and action. Because the contract governs the project and defines the scope, change planning begins during the bidding and contracting phase, when budget and schedule are approved for the scope of work. Change planning is then facilitated by diligent contract administration throughout the project to closeout and startup.

A project consists of a defined scope of work, budget, specified completion date, and other stakeholder expectations including quality. "Any or all four of those elements can change during the life of a project, [and] the causes of project changes are almost without limit." (Douglas III, Understanding Schedule Change Management). By capturing information about problems before and as they occur, the project team will have available data about the root causes of change and improve their ability to defend against claims. A project record-keeping system should be created, to document job progress. Records will typically include timecards, receipts and shipping manifests, daily logs, meeting minutes, field notes, and more.

The timing of the change will determine the impact of the change; as the effects of early changes may be easier to mitigate. "Research by CII has shown that projects have a declining ability to recover lost schedule (and costs) in their later stages." (Douglas III, Understanding Schedule Change Management) The later a change occurs, the greater the cost impact, the lower the ability to recover schedule, and the more likely the change will become a claim.

Forecasting and Risk Analysis

Once the schedule and budget have been approved, the project team can develop a cash flow expectation and plot it as a curve against which project progress may be measured. The data gathered through periodic status reporting will enable the team to revisit goals and detect trends, by comparing the actual progress achieved against established milestones. If sufficient baseline data and scheduling expertise are available, earned value techniques can be used to measure cost and schedule progress against measured intervals. As deviations from the baseline are noted and their impact forecasted, the team can take corrective action as needed to compensate for the effect of change on cost and schedule.

Ideally, work associated with the change will not begin until the change order has been issued, and the resolution of change orders will not delay project work for any significant period of time. Timely review and approval of change orders can empower the team to react quickly to mitigate the consequences of the change. Further, expedient review and dispatch of change orders may prevent them from becoming claims during the closeout phase of the project. “It is cheaper to resolve conflict within the day-to-day onsite contract administration mechanism rather than referring them to a third party for resolution.” (Aibinu, 2008)

Even with an established change management plan, projects may suffer from scope creep. “Scope creep is a term used to describe unauthorized scope changes. Unauthorized changes may creep into project scope as a result of verbal instructions, e-mail instructions, written instructions that have been issued without realizing the magnitude of change, etc.” (Khan, 2006) Because project scope is the primary driver for cost and schedule, scope definition and management are a critical component of change management and project success. Scope creep occurs when the change management plan is circumvented, often with the intent to expedite work. By limiting the authority to approve changes, and ensuring all team members are familiar with the authorized scope of work and the contract, the project team can help ensure only appropriate team members are empowered by the contract to change the course of the project and affect cost and schedule. With a strong scope management process in place, “payment for extra work that has already been performed can be rejected if the individual requesting the change order is not authorized under the contract.” (Stephan & Harmon, 2001)

Claims management and the forensic assessment of claims are analogous to the change management process but are conducted when changes cannot be resolved as a change order and instead result in a dispute or claim. The goal is not so much to mitigate impacts as to “determine causation, damages, and liability (i.e., responsibility and entitlement).” (ACE International, 2006) As with change order review, the goal of claims analysis is to obtain persuasive factual evidence to support or disallow charges. In many instances, this may mean dismissing the claim for a number of reasons, including: faulty mathematics, insufficient documentation, failure to follow procedures, or the use of unit rates or markups that differ from those specified in the original contract. “In a legal situation, the best preparation for or defense against a claim is using best practices and maintaining thorough, accurate, and complete records of all communications, plans, actual cost and schedule performance data, and so on.” (ACE International, 2006)

Using Contingency

Contingency is a cost line item that is added to the base budget, whose use is intended to offset the likely effects of change and uncertainty. “Contingency ... is a cost element that must be added to the base budget to achieve an acceptable level of confidence, taking into account an assessment of risk factors, in completing existing approved scope within schedule constraints and, thus, meeting the prime objective.” (Shotwell & Schmitz, 1993) Note that contingency amounts are not set aside for extraordinary budgetbusting risks, such as acts of God or unanticipated regulatory issues.

Contingency may be calculated simply, as a percentage of construction cost, or the amount may be developed using a quantitative probabilistic risk model. Different contingency categories may be created and tracked separately, such as contingency amounts for owner-directed changes, escalation, equipment, and contractor issues. The percentage allocated to each contingency is representative of its risk magnitude, thus each category of contingency may be calculated differently.

As with change and claims management, contingency management is a process. “Project controls must establish an effective contingency management process and procedure that defines the terminology, outlines the responsibilities, as well as establishing the process and control requirements to efficiently support the successful implementation of contingency management on the project.” (Douglas III, Contingency Management on DOE Projects, 2001) If an activity is forecasted to cost more or less than the amount originally budgeted, funds may be shifted from the contingency budget as appropriate. Approvals must be required prior to

contingency use, and tracking is necessary. Every dollar of contingency funds added to a WBS line item must be balanced by an equal negative change to the contingency line item. A log may be maintained by project controls to record use of contingency and establish an audit trail, especially when changes have been bundled together.

“The majority of project changes are concentrated in the first 50% of the project construction duration.” (Chen, 1992) As the project progresses and it is determined that the level of risk has declined, amounts held as contingency may be released back to the general fund for other uses by the owner. In order to do this, the contingency account must be assessed on a regular basis and the need for funds evaluated. However, in doing this, there is some risk assumed by the owner. “Although risks and contingency requirements can generally be expected to decrease as a project progresses through planning and design development, new risks may appear after planning is complete - even during construction. (Shotwell & Schmitz, 1993) If funds have been released from contingency for other uses, those funds might not be available if a need arises due to change. Review of contingency, then, is best conducted hand-in-hand with the periodic project risk re-assessment.

Reporting

Visibility of change will most likely be provided through project reporting to stakeholders, making the reporting function a key element of change management. “As the project proceeds through its lifecycle, decision-makers need to receive information that is meaningful to them, appropriately actionable at their level, and sufficiently timely to enable them to guide the project.” (Nalewaik & Witt, 2009) The information desired in the report will vary from project to project, depending on the stakeholders involved. “Project teams ... must create a report that is tailored to its audience so as to be concise, comprehensible, consistent, and to provide the information needed for management to make decisions and take action.” (Nalewaik & Witt, 2009) For effective change management, the data reported should include not only expenditures to date as compared to the approved budget, but also a cost forecast, variance report, and detailed information about risks. In order to be effective as an early-warning system, the report needs to be available on-demand, which requires that the system be updated in real-time with the most recent project data. In addition, “... a system should be established for special reporting of any situation that has affected or has the potential for significantly affecting cost or schedule so that these items can receive special attention.” (Neil, 1989) One solution to the reporting challenge may be the development of a project ‘dashboard’ report, an automatable function commonly available in project management software packages.

Conclusion

In addressing change, the project team can use various tools to improve the management of change, mitigation of risk, and avoidance of claims. Since project evolution is likely and may pose a threat to satisfactory completion or achievement of project goals, change cannot be ignored; it must be acknowledged and managed appropriately. Change management must be administered at the organizational level, by implementing appropriate controls and instituting a change management methodology. Change and claims processes should be specified in the contract and supported through stringent contract administration.

Although there is no single best-practice process for change management, the methodology should:

- facilitate prompt response to potential changes before they occur
- enable visibility of change through reporting, trend analysis and forecasting
- incorporate risk analysis as an ongoing, iterative process
- capture documentation in as much detail and with as much clarity as possible
- include contingency-use approvals and tracking

By planning for change in advance of its actual occurrence, and remaining aware of the changing nature of risk as the project progresses, impacts to the project may be minimized or avoided completely.

About the Author

Alexia Nalewaik CCE MRICS is a Principal with QS Requin Corporation, a quantity surveying firm and management consultancy, providing construction cost control services to public and private sector entities undertaking capital improvement programs. Prior to QS Requin she was a senior manager with Moss Adams, LLP, leading the firm's construction audit and advisory practice. She has over 17 years of public and private sector industry experience, in cost and risk management, owner's representative services, independent audit, contract compliance, and project controls best practices. Alexia has a bachelor's degree in physics, a master's degree in structural engineering, and is a Certified Cost Engineer and Chartered Quantity Surveyor. She currently serves on the executive boards of AACE International, ICEC, and RICS Americas.

Bibliography

AACE International (2006). Total Cost Management Framework. Morgantown, WV: AACE International.

Adams, J.S. (1965). Inequality in social exchange. *Advances in Experimental Social Psychology*, Vol. 2, New York: Academic Press.

Aibinu, A. A. (2008). Managing Building and Civil Engineering Project Claims to Enhance Organizational Justice and Reduce Dispute. *Construction and Building Research Conference*. London, England: RICS.

Baar, J. A., & Jacobson, S. M. (2004). The Keys to Forecasting - #3 Change Control. *Cost Engineering*, 46 (4).

Chen, M. T. (1992). Change Control and Tracking. *AACE International Transactions*. Morgantown WV: AACE International.

Douglas III, E. E. (2001). Contingency Management on DOE Projects. *AACE International Transactions*. Morgantown WV: AACE International.

Douglas III, E. E. (2003). Effective Management of Project Change Orders. *AACE International Transactions*. Morgantown WV: AACE International.

Douglas III, E. E. (2000). Project Trends and Change Control. *AACE International Transactions*. Morgantown WV: AACE International.

Douglas III, E. E. (n.d.). Understanding Schedule Change Management.

Jarnagan, H. W. (1993). The Project Trend Program. *AACE International Transactions*. Morgantown WV: AACE International.

Khan, A. (2006). Project Scope Management. *Cost Engineering*, 46 (6).

Kumar, D. A. (2000). Managing Changes in Large Programs. *AACE International Transactions*. Morgantown WV: AACE International.

Nalewaik, A. A., & Witt, J. E. (2009). Challenges in Reporting Project Costs and Risks to Owner Decisionmakers. *AACE International Transactions*. Morgantown WV: AACE International.

Neil, J. M. (1989). Session S5: Management of Project Risk. *AACE International Transactions*. Morgantown WV: AACE International.

Owens, S. D., & Martin, M. D. (1988). Management Change in the Project Environment. AACE International Transactions. Morgantown WV: AACE International.

Shotwell, N. H., & Schmitz, J. (1993). Contingency Management for the Hong Kong Airport Core Program (ACP). AACE International Transactions. Morgantown WV: AACE International.

Stephan, B. M., & Harmon, K. M. (2001). Claims Avoidance Techniques: Best Practices for Contract Administration. AACE International Transactions. Morgantown WV: AACE International.

Tichacek, R. L. (2006). Root Causes: The Six Reasons for Change. AACE International Transactions. Morgantown WV: AACE International.

Williamson, O.E. (1979) Transaction cost economics: The governance of contractual relations. Journal of Law and Economics, 22 (October).