

# USING CONSTRAINT MANAGEMENT TO OPTIMIZE MOTION PICTURE PRODUCTION MANAGEMENT

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**Date:** December 1, 2005 **Publication:** Project Management Journal **Author:** Worley, Tracy L F

## ABSTRACT

This paper presents the application of constraint management (CM) concepts for motion picture projects, which have three primary phases (pre-production, production, and post-production) and two secondary phases (distribution and exhibition) utilizing whole system methodology. The methodology described is an orchestrated approach for making routine decisions across motion picture phases that contain significant levels of uncertainty. Constraint management is a whole system approach that can allow for estimation and feedback leading to optimized projects.

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Vol. 36, No. 4, 44-52, ISSN 8756-9728/03

## INTRODUCTION

Motion picture production is the phase-based technique of developing a filmed or taped version of a story. This technique begins with concept and ends with the motion picture version of a developed screenplay. Ultimately, whether drama or documentary, the goals of the motion picture production are distribution and exhibition. In order to obtain a distribution or exhibition deal, the motion picture must be of a quality that warrants further exposure and is expected to generate substantial income for the distributor.

Although it is a relative term, quality is one of the critical factors that helps to determine a product's success. Once a product - in this case, a completed motion picture - has met industry quality standards (i.e., conformance to picture and sound quality, technical quality, believable acting, engaging story line or topic, human interest), in order to be successful, it must also enter the realm of system quality and process, which demonstrates a quality optimization that can affect the customer relationship to, or interaction with, the supplier (filmmaker or motion picture producer/project manager). One such system-level process is constraint management (CM).

CM is a system tool that can provide additional checks and balances on all aspects of production quality, and recognizes that other factors, as well, can contribute to the overall success or failure of a motion picture. These factors, known as system constraints (Dettmer, 1997), must be anticipated, recognized, and controlled in a comprehensive and well-orchestrated manner in order to overcome many of the uncertainties on which cross-phase motion picture decision-making balances.

## CONSTRAINT MANAGEMENT PRINCIPLES AND CONCEPTS FOR MOTION PICTURE PRODUCTION

Constraints can be physical or environmental (such as people, materials, or equipment and supplies), or policies (such as business practices, regulations, and laws). Often, business practices can impede project work, thereby causing an environmental constraint. For example, if a studio policy is to restrict technical personnel from "multitasking," optimizing resources may be severely hindered.

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CM has a prescriptive theoretical basis. Unlike descriptive theory, which explains a process but offers no recommendations for enhancement, CM describes a system process and prescribes guided action for the improvement of that process. CM, then, is a system tool that can provide guidance for orchestrated and comprehensive motion picture production management through prescribed actions.

The most obvious constraint on a motion picture project is financial. Financial constraints can severely limit productivity, or even cause a project to be aborted. Other constraints include limitations of talent (not having the required talent available when needed), immobility (limited or severely restricted unit movement or mobility), time (lack of product timeliness or inefficient use of time on the set), union regulation (technical and non-technical staffing policies could limit productivity), and technology (unavailability of required equipment and other technological resources such as computer animation, special effects, etc.).

Even though the impact these constraints have on a motion picture project can hinder any or all of the phases, they are preventable. With adequate constraint management, these constraints are not likely to cause the untimely demise of this artistic venture. By examining the phases of motion picture production, we can begin to understand how time and risk are handled using constraint management.

Developed by Dr. Eliyahu M. Goldratt in the 1980s, the Theory of Constraints (TOC) suggests a way to optimize system performance, as opposed to maximizing a process for performance. By optimizing the outputs of an entire organization (in this case, a motion picture production), instead of just optimizing a part of the organization (such as preproduction), better system performance can be attained more quickly and consistently (Goldratt, 1990). TOC is a correction method that is a logic-based approach to system improvement. Motion picture production is a linear and logical system of chartering a project, planning, executing, controlling, and closing it. In order to understand how TOC applies to motion picture production, we must identify and define the critical chain (a technique pioneered by Robert C. Newbold to measure organizational performance with rates of input and output, leverage, and resources) governing motion picture production phases. (See Figure 1.)

## MOTION PICTURE PRODUCTION PHASES

### PRE-PRODUCTION

Pre-production consists of the initiation and planning phases. Prior to pre-production planning, a motion picture project gets the "green light" from studio executives or independent project sponsors to begin development. During pre-production, non-technical staff develop the script, hire the actors, secure the locations, arrange for equipment and technology, secure permits and licenses, conduct fundraising, cast for talent or performers, and hire technical staff. Risk management is particularly important during pre-production. During this phase, producers/project managers can detail the potential challenges of production, from talent to mechanical failures. It is also during this phase that producers/project managers can assess how to handle each challenge in ways that do not cause project delays or budget overruns.

### PRODUCTION

Production is when the planning is executed and controlled. Execution is the largest and most costly component of production while controlling generally comprises troubleshooting, change control, and workarounds. Time

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management is essential during this phase. It is not difficult for a project timeline to run amok when so much is at risk - finances, dependability of equipment, temperament of talent, professionalism of crew. During this phase, producers/project managers must keep a watchful eye on the areas identified during pre-production as risk areas, and be ready to apply predetermined solutions or troubleshoot ways around the challenges.

## POST-PRODUCTION

Controlling continues in post-production because the elements that were assembled to execute the project are pulled together to produce the edited motion picture. During post-production, sound, picture, and special effects editors piece together the images into one cohesive whole that satisfies the sponsors and potentially the other stakeholders (audience). Unlike what can occur during production, both time and risk management are important during post-production; however, neither has the propensity to become uncontrollable. Post-production risk is more easily managed because there are fewer risk areas for which to plan. For the most part, producers/project managers control the time spent in post-production; therefore, time management is limited to supervising the risk involved with conflicting editing schedules, unreliable editing equipment, or damage to developed film or tape.

## DISTRIBUTION

Distribution, or licensing rights, can be arranged during any of the project management phases. During initiation or planning, pre-sales of distribution rights can finance production. A work-in-progress that is "four-walled" (whereby a filmmaker rents out a theater to show his or her film) during production can also generate revenue from potential distributors. Licensing rights include domestic and foreign box office, pay-per-view, premium cable, home video, television, syndication, and foreign distribution channels (television and cable, for example). Distribution can also be obtained when the motion picture project is in the closing phase. This often occurs through film festival exhibition after project closeout. During this phase, time management is not usually a factor unless there is a prescribed time allotted to raise funds or to obtain a distribution deal. Risk can manifest itself during distribution as the cancellation of a licensing agreement when terms cannot be met. During distribution, producers/project managers control neither time nor risk because the constraints of each are usually set by stakeholders outside of the production process.

## EXHIBITION

Exhibition occurs after project closeout when licensing actually begins. The distributor, who owns a particular set of rights for a specific period of time, shows the motion picture at venues or on channels covered under his licensing agreement and generates revenue. If no rights are sold, the sponsor may "four-wall" the motion picture in order to generate revenue for himself. Here again, risk and time are almost always out of the control of producers/project managers.

## SEPARATE AND UNIQUE PHASES

Because each phase of motion picture production is unique, the constraints identified in each phase must be managed separately so as not to impact future phases of the project. This is done by estimating the level of each constraint and planning for its resolution when a challenge occurs.

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A motion picture project will fail if just one link fails. If the script is never fully developed, the motion picture may not have a believable plot or engaging storyline. If full financing is not in place, the motion picture may not be completed. If the director of photography's shot composition is poor, the picture may be a visual failure. If the production manager does not file timely payroll reports to ensure paychecks on payday, the staff may quit and the movie may not be completed. If the editing suite is unavailable, delivery of a finished product will be delayed. If the composer does not produce a soundtrack, producers/project managers may have to explore other avenues for music, potentially increase the budget, and delay the delivery of a finished product. If the producers/project managers and distributor are in dispute over the producer's equity or the number of screens on which the motion picture is released, a distribution deal may never be achieved. If a theater chain refuses to provide the desired number of screens or showings, an exhibition deal may be difficult to obtain. If a theater misprints tickets and does not correctly apply revenue, the distributor loses money.

Each link is critical to the system, and the system is only as successful as its process. In order to optimize the motion picture production system, each phase must be improved to ensure that breakdown structures are optimal, risks are managed, and quality is controlled.

## PRODUCTION ISAN ESTIMABLE PROCESS

### PROCESS VS. SYSTEM

By using estimations of process and function, technical and non-technical inputs, and human and other resources, producers/project managers can identify the things that could possibly go wrong and find ways to deal with them before they happen. Each phase of a motion picture production is a series of processes that accomplish specific objectives. As a whole, the phases consist of a collaboration of steps that accomplish a series of objectives and one particular goal the edited, ready-for-distribution motion picture. The process, then, of motion picture production differs greatly from the system in which production resides. The motion picture production system is development to delivery, pre-production to exhibition. In order to optimize the system, the processes in each phase must be optimized. Optimizing entails troubleshooting the potential risks or uncertainties, and identifying preventive measures and controls.

### UNCERTAINTIES ASSOCIATED WITH PRODUCTION

Motion picture production is an imperfect art form. It represents all of the speculation and risk that define consumer trends and spending habits. Because there is no true and dependable formula that can predict the success, failure, revenue, or net loss of a motion picture project, the process is full of uncertainties. The risks that are most likely - and that routinely occur in most motion picture productions - are common and expected uncertainties, which are usually related to equipment failure. Some include film, tape, and audio malfunctions, blown light bulbs, and faulty set construction. The risks identified, but assigned a low level of risk, are infrequent uncertainties. Infrequent uncertainties are not expected to happen, but risk control is planned in the event that they do occur. Talent and crew are arguably the most common cause of infrequent uncertainties, and include talent and crew resignations, injuries, and breach of contract on studio or location shoots.

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Unexpected uncertainties are those that are not usually identified during planning or the development of the risk management plan. Few producers/project managers anticipate that a financial backer will pull out, but it can happen. Some unexpected uncertainties include replacement of the director by a studio or other executive, and shelving of a script in mid-production, resulting in cancellation of the production. In order to reduce the uncertainty of motion picture production, producers/project managers should be most concerned with those risks that are unexpected and infrequent. Most uncertainties can be minimized by using constraint management.

## REDUCING PRODUCTION UNCERTAINTIES

A chain fence is only as strong as its weakest link. In a motion picture project, one unexpected or infrequent uncertainty can break a project and cause premature closeout or project cancellation. It is then critical that all (or most) uncertainties be anticipated, recognized, and controlled so that cancellation of the project can be avoided. During production of the independent motion picture "The Learning Curve" (2001, Ian Reinhardt, Director/Executive Producer), several uncertainties that could have been planned for, but were not, impacted the project, caused budget overruns, and led to the termination of some production personnel. Locations were unavailable on the scheduled shooting day, production staff was unavailable during critical junctures, talent was unavailable for call, equipment had to be replaced midshoot, and lead actors had to be replaced after production began. While these uncertainties may seem devastating, similar things happen on motion picture sets with regularity. Avoiding these uncertainties can save a production. For example: talent demands a larger trailer and a daily 6-pack of Sunkist orange soda. Anticipating this means providing a budget contingency to cover such demands, perhaps 10% of the total budget, so that unforeseen demands or requests may be met with relative ease. All of the camera equipment is stolen. Anticipating this means one of two things: 1) securing insurance to cover loss or theft and liability, or 2) hiring security to guard the equipment when it is not in use. The camera magazine jams with partially expended film inside. Recognizing that camera magazines jam all the time, additional magazines should be loaded and placed on standby. In case the partially expended film is destroyed, producers/project managers should have arranged for negative insurance in advance of production.

As the list of risks is devised, the producer/project manager should categorize them according to frequency. For example, while mechanical failures can be frequent, the cancellation of a contracted location for the shoot is likely to be infrequent. Identifying the differences between the potential risks or uncertainties can help a producer/project manager to manage them while the production continues. Figure 2 illustrates a chart of categorized motion picture production uncertainties as experienced during "The Learning Curve" production.

The plan of action devised for each uncertainty should be a process guide for ongoing improvement on the set. A good producer/project manager, however, will not only identify uncertainties and establish plans for resolution, but will also identify ways to avoid those uncertainties. For example, a missing signature on a contract could easily nullify the location agreement, or equipment that was not tested prior to deployment can postpone a production for hours, if not days. In order to avoid these scenarios, a producer/project manager should take every precaution and practice proper planning, which can help a producer/project manager control uncertainties so they do not derail the production completely. A risk management plan identifying the uncertainties and listing viable, constructive risk controls is critical to controlling uncertainties on a motion picture production. Figure 3 illustrates the preventive planning associated with each uncertainty.

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## USING CONSTRAINT MANAGEMENT FOR UNDERSTANDING AND MANAGING MOTION PICTURE PRODUCTION PROCESSES

CM can be applied to any process employing problem-solving and, when applied to the motion picture production system, some methods in critical chain project management can be used to improve process and, thereby, optimize overall organizational performance.

In a presentation at the Jonah<sup>SM</sup> Upgrade Workshop/ Theory of Constraints Symposium in May 1998, Dale Houle of the Avraham Y. Goldratt Institute introduced TOC by exploring thinking processes and their applications. By examining cause-and-effect relationships in terms of uncertainties, one can alter reality to suit the current need (Houle, 1998). Basic thinking processes, which employ asking and answering questions, can help to eliminate a problem. A framework of constraint theory, such as logic models, can help to determine if solutions will work.

## ORCHESTRATING MOTION PICTURE PRODUCTION PHASES USING THE THEORY OF CONSTRAINTS

Many producers are unaware that they use TOC during normal operating procedure, both on and off the set. Troubleshooting occurs in the production office, on the motion picture set, and during post-production. Orchestrating the production phases using TOC means methodically listing the uncertainties for each phase and establishing a planned risk management process to control the uncertainties. What some producers/project managers do not do is make a complete enough list so that infrequent and unexpected uncertainties can be dealt with efficiently and without detriment to the project.

TOC can be used to improve each phase in motion picture production by proffering a way to optimize existing resources, from the weakest to the strongest, in order to improve that system. During pre-production, the question "Will enough money be raised to finish the project?" is often asked. By assessing the dollars needed to finish the project, and raising the majority of funds before and during pre-production planning, this common and expected uncertainty can be minimized. If the dollars needed are raised, shoot. If not, postpone.

One of the weakest links in the production phase is the shooting script, a changeable element of production. If the project sponsor is expecting the script to be shot without modifications and the director insists on changes, the shooting script becomes a constraint. This link can be optimized by using an advance inclusive strategy that brings together sponsor and other stakeholders to negotiate the acceptance of the shooting script. Another plan of action is to shoot the script as is, shoot the alternative scenes, and then screen both for a stakeholder audience in order to determine which gets the best response. Another common and expected uncertainty is stakeholder expectation. In the same way that the shooting script must be acceptable to the project sponsor during production, the final cut must be acceptable to the project sponsor, producer/project manager, director, studio, and distributor. By garnering support for the shooting script early in the process (reviewing it with stakeholders, checking the dailies, engaging stakeholders at the start of post-production), the final cut can be optimized using these inclusive tactics.

## GOLDRATT'S LOGICAL THINKING PROCESS

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System thinking is the logical thinking process developed by Goldratt that consists of logic trees for system optimizing and modeling. The logical thinking process is illustrated as a tree with branches and leaves (outputs) that are all connected to the tree trunk (leverage) and are fed by the soil and precipitation (resources). As such, the system addressed in each tree has links or phases that are dependent on each other for success. (See Figure 1 for an example.)

TOC provides a logical framework and tools for the continual identification and resolution of potential problems. In Goldratt's process, there are five distinct trees: 1) current reality tree; 2) evaporating cloud; 3) future reality tree; 4) prerequisite tree; and 5) transition tree. The five tools and their application to motion picture production are:

- 1) Current reality tree - Captures the experience and intuition of participants. It identifies the cause and problem of an organization. In motion picture production, the skills and knowledge of producers/project managers, directors, and other technicians will all contribute to problem-solving.
- 2) Evaporating cloud - Identifies a solution to the problem identified. It helps determine what caused the problem in the first place. In motion picture production, this would take the form of recognizing why an event could take place. If the uncertainty is investment cancellation, then the question "What can prevent investment cancellation?" is asked. The answer or solution could eliminate that uncertainty.
- 3) Future reality tree - Analyzes what is missing from the solution. It allows for the improvement of a solution before it is implemented. In motion picture production, this means determining the factors that can contribute to the problem resurfacing - and resolving those issues before they occur. In this way, the future reality can be altered.
- 4) Prerequisite tree - Designed to execute change, or reach a solution. In motion picture production, this action plan becomes "the bible" for dealing with Murphy's Law. The steps in the action plan are the prerequisites for preventing disaster.
- 5) Transition tree - Creates a work breakdown structure based on the milestones identified with the prerequisite tree. In motion picture production, the resignation of the director may be directly tied to a studio relationship. In that circumstance or environment, a solution should be devised that can either prevent the resignation or provide for alternatives should it be impossible to prevent (Goldratt, 1986).

For motion picture production system optimization, the last two trees, prerequisite (PRT) and transition (TT), are most useful. If a risk management plan has been established to troubleshoot and resolve the uncertainties of the motion picture production system or one of its phases, the PRT is utilized as a tool for facilitating risk resolution. It helps to identify implementation issues, sequence risk controls and resolution, steps to overcoming obstacles, and milestones for execution. Figure 4 illustrates a portion of a prerequisite logic tree for averting a script-to-screen stakeholder disaster. Figure 5 illustrates a portion of a transition tree that breaks down the tasks for script rewrites.

By using these tools, a producer/project manager can identify what needs to be changed and how to implement the change. Once the producer/project manager has utilized these tools and developed his action plan for ongoing improvement, he can begin to think in terms of optimizing the motion picture process for future productions.

## OPTIMIZATION VS. IMPROVEMENTS

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Because motion picture production is such a high-risk pursuit, managing constraints is critical. However, just managing constraints is not enough - a producer/project manager must be able to improve his process from project to project. Isolated efficiency, a singular approach to problem solving, involves the resolution of one phase, not the entire process. In motion picture production, this could mean the improvement of front office capacity, or streamlining the grip crew, for example. Improving any one segment of the project does not lead to overall improvement. If the directorial team is improved, but the camera crew continues to have difficulty, the directorial efficiency is isolated and not beneficial to the entire project. In motion picture production, every uncertainty should be identified and planned for, every potential risk should be managed and controlled, and every phase of the project should be comprehensively assessed - from the weakest to the strongest link in the chain - so that all potential problems can be prevented or dealt with expeditiously.

## CONCLUSION: OPTIMIZING MOTION PICTURE PRODUCTIONS THROUGH CONSTRAINT MANAGEMENT

Effective project management (with or without a camera) is critical to the success of any project, and provides a foundation for project implementation that is as essential to motion picture production as it is to product development or construction. Motion picture producers are master project managers - from the independent short to the major blockbuster release, motion picture production entails an intricate series of phases and steps that must all be completed in order for the project to close-out successfully. By applying the tools of project management to motion picture production, producers/project managers can create with controlled risk, manage constraints, and enhance their productions by using effective techniques for optimizing project performance.

Motion picture production is a critical chain process, each phase of which should be completed prior to the commencement of the next phase. Because motion picture production is so high risk, the most efficient way to handle uncertainties is to thoroughly assess and manage them at the outset.

Logic models are useful tools for assessing uncertainties and planning solutions before problems arise. Reality trees illustrate how a producer/project manager can logically and sequentially map out an uncertainty, evaluate the factors involved, and propose viable solutions in advance. Constraint management provides a roadmap for optimizing motion picture productions and reducing overall risk.

## REFERENCES

- Dettmer, H. W. (1997). *Goldratt's theory of constraints: A systems approach to continuous improvement*. Milwaukee, WI: ASQ Quality Press.
- Goldratt, E. M. (1986). *The goal*. Croton-on-Hudson, NY: North River Press.
- Goldratt, E. M. (1990). *The haystack syndrome: Sifting information out of the data ocean*. Croton-on-Hudson, NY: North River Press.
- Houle, D. (1998). *Introduction to the theory of constraints*. JonahSM Upgrade Workshop/TOC Symposium. London: Avraham Y. Goldratt Institute, <http://www.goldratt.com/juk4t.htm>

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