



Managing Construction Projects

*Have you taken your project's pulse lately? Project Health Checks*

Lorman Education Services

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On today's major projects sophisticated project controls, procedures and management plans will have been developed with experienced project management teams in place to oversee the construction activities as well as financial integrity of the project. However, if history is any indicator, many of these projects will find their way to a dispute with 16% of projects likely to incur a delay and 35% likely to experience a cost over-run<sup>1</sup>.

Is it possible that one of your projects is currently running behind schedule, over-budget or has seen a surge of potential delays, which while plaguing the site-team, have not been adequately addressed in the latest monthly project status report? Perhaps you need an Independent Project Review (IPR) from an external advisor to test the accuracy of the information reported, the costs being incurred, the progress being achieved, and the time being logged on timesheets coded to your project. These are just a few of the areas explored during Independent Project Reviews (Construction Audits, Peer Review, Due Diligence Assessments, Value for Money Assessment etc...) IPR's can be carried out voluntarily, to comply with funding agreements and Enterprise Risk Management (ERM)

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<sup>1</sup> Global Construction Survey 2007, KPMG, Construction Procurement for the 21st Century



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frameworks, or statutory requirements, and can often identify trends which may threaten the success of the project, impacting your ability to 'open for business'.

It is very rare that an IPR will result in a simple 'thumbs up'. IPRs often identify necessary improvements or procedural changes which result in reduced risk, increased transparency, greater awareness, enhanced risk management, and more robust project governance. IPRs can be carried out at the project or portfolio level, and from two perspectives, the business unit and the organizational level. In GREYHAWK's experience, IPR's are more effective when the review has the full commitment from management and a stakeholder sponsor personally appointed to agree with the scope of the audit, and to ensure we have access to project staff, records, communications and all relevant information to allow the audit team to form an accurate picture of the project.

The issues addressed in each IPR will vary but need to be systematic to determine if your organizations strategic, operational, reporting, and compliance objectives are being met. IPRs identify non-compliance and deviations in project governance, record keeping, progress monitoring systems, payment and cost control, and weaknesses in the organization's risk management capabilities.

A 'risk' is simply the likelihood of any deviation from an expected or defined outcome. The consequences can be certain or uncertain and can have positive or negative effects on your objectives. Both threat and opportunity should be held with equal regard and an organization with a mature risk management culture will have a greater emphasis on opportunity and a more aggressive appetite for risk. Project audit teams may also identify



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integrity issues (overbilling, double billing, over-valued assets/claims recovery, etc.). IPR's may uncover inefficiencies by the managing partners of a CAPEX JV or Special Purpose Vehicle (SPV) where the interests of minority partners are not being protected with the same financial efficacy.

Whatever the method of project delivery, every entity exists to provide value for its stakeholders. That value is protected and maximized when senior management sets strategy and objectives to efficiently and effectively deploy resources in pursuit of the entity's overall objectives and ensuring that delivery methods are in alignment with the organizations risk appetite and operational strategy<sup>2</sup>. An independent project review or 'health check' on any large Engineer-Procure-Construct (EPC) contract is normally undertaken by technical, legal and accounting teams. The teams usually include both 3rd party, and internal independent sponsors to facilitate access to key staff and the gathering of project information and data. The primary categories of examination are usually broken down into manageable elements and include:

- Scope Development/Control
- Project Governance
- Time Management
- Cost Control/Record Keeping
- Quality Assurance/Quality Control
- Risk Management

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<sup>2</sup> Enterprise Risk Management - Committee of Sponsoring Organizations of the Treadway Commission, 2004 (COSO)



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Depending on the size and complexity of the project, these elements could be grouped or organized to suit the frequency, budget and timescale available to carry out each audit. IPR's can be carried out as 'one off' health checks, or scheduled at predetermined intervention points throughout a project's lifecycle with each audit concentrating on one of the six elements described above. Project audits on PFI/PPP<sup>3</sup> projects are required prior to financial close, and are often required throughout the project at predetermined stage gates. GREYHAWK has found from experience that to maximize the benefits of an IPR, the project or sponsoring organization should already have in place:

- A compelling business plan, stating the objectives of the project.
- A mechanism to assess compliance of the completed project to its original objectives
- Clearly identified stakeholders with an interest in the project
- A defined method of communication to each stakeholder
- A specification for the project monitoring of deliverables
- Clear assignment of project roles and responsibilities.
- A current, published project plan that spans all project stages.
- A robust system for progress reporting.
- A robust system for identifying, monitoring, and allocating risks and contingency usage.

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<sup>3</sup> Project Finance Initiative/Public Private Partnership



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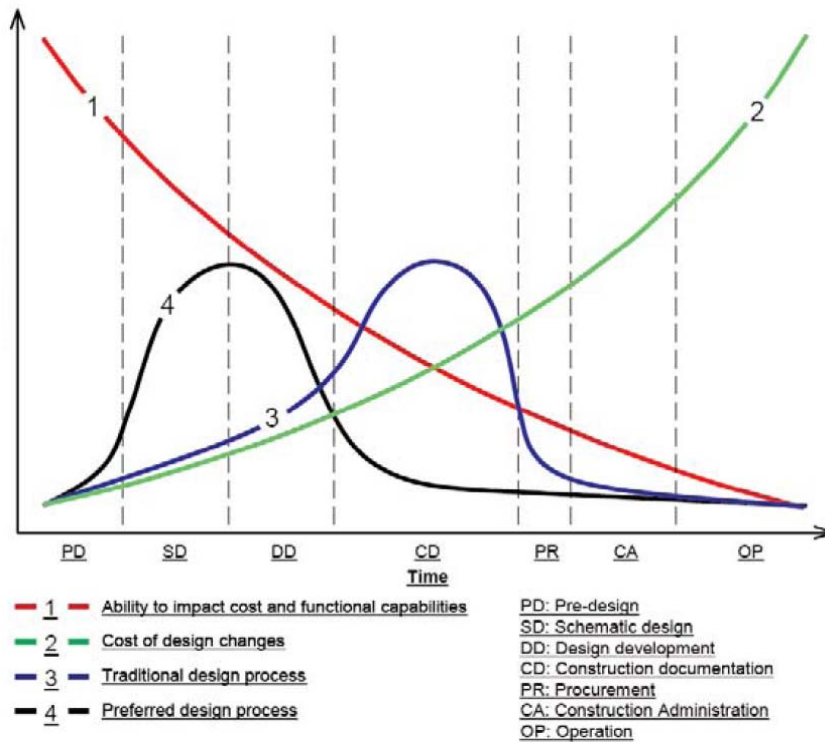
- A central document repository for the project ('Paper is King')
- A centrally-held glossary of project terms, acronyms, definitions, coding structure, WBS codes, etc.
- An effective change management system (time, cost, scope alterations/deviations)
- A process for recording and communicating new risks identified during the project
- Standard project governance documents (Project Execution Plan / Project Management Plan)

If these elements are not in place, the IPR will surely result in immediate benefits with recommendations on how to establish these elements on existing or future projects. On large projects, either a full-scale, or a smaller, more focused IPR can be carried out at different intervention/stage gates. The stages of many building type projects, for example, are usually defined as:

- Conceptual Design
- Schematic Design
- Design Development
- Procurement
- Operation

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On EPC delivered projects, particularly chemical and oil & gas projects, the FEED<sup>4</sup> (Front-end Engineering Design) stage replaces the conceptual, schematic and design development phases.



As the "effort/effect" figure<sup>5</sup> illustrates, the "Ability to Impact Cost and Functional Capabilities" reduces from Pre-design (PD) to Operation (OP), with minimal influence during Construction Administration (CA) stage. An IPR carried out during

<sup>4</sup> The FEED stage starts with material and energy balance calculations and a project governance plan. It includes preliminary equipment design and layout and the initial project schedule and cost estimate. The FEED stage usually ends with major equipment specifications, a definitive estimate and a project execution plan.

<sup>5</sup> Collaboration, Integrated Information and the Project Lifecycle in Building Design, Construction and Operation Presented by the Architectural/Engineering Productivity Committee of The Construction Users Roundtable (CURT) - 2004



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the Construction Administration stage would focus on different elements of project governance than those reviewed during earlier stages, with diminishing influence (see line 1).

Involving an independent 3rd party can promote benefits during the Risk Assessment, Risk Management, or Risk Monitoring Stages<sup>6</sup>. Reviewing the effectiveness of both Project Governance and Risk Management are seen as the most effort intensive tasks required of the audit team. The benefits of the IPR are enhanced as the IPR team becomes more familiar with the organization and its policies, by ensuring consistency between project delivery and the original intentions set out in the business case, and by uncovering any "optimism bias"<sup>7</sup> or "strategic misrepresentation"<sup>8</sup>, either by those executing the plan (in the field), or by those reporting progress and making crucial decisions remotely.

The IPR encompasses only part of an ongoing process of ensuring that an active rather than just a controlling role is taken by those accountable for project delivery. This is because Project Governance is not well understood or executed in organizations which are becoming complacent with inaccurate and untimely information. In some cases certain organizations have actually postponed key decisions regarding time sensitive

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<sup>6</sup> Business Risk Assessment. 1998 - The Institute of Internal Auditors

<sup>7</sup> Optimism bias is the demonstrated systematic tendency for people to be over-optimistic about the outcome of planned actions. This includes over-estimating the likelihood of positive

<sup>8</sup> Strategic misrepresentation is the planned, systematic distortion or misstatement of fact-lying-in response to incentives in the budget process. Examples of strategic misrepresentation in budgeting illustrate that it is a contingent strategy responsive to a system of rewards in a highly competitive game where resource constraints are present. Not all budget advocacy requires or involves misrepresentation, nor is all budgetary strategy intended to misrepresent.



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project delivery issues until their next regularly scheduled board meeting. Corporate-wide (enterprise) based reporting systems usually require progress and decision support information from individual projects to be formatted and abridged into standardized reporting formats. This results in important details being sacrificed due to restrictions in standardized inherent in these formats.

**What is a Project Health Check?**

A proper project audit should see each project as part of an overall program or capital investment. Depending on the timing, the IPR may evaluate different aspects of risk throughout the project's lifecycle to address the following tasks:

- Evaluate the elected design solution to determine if it is consistent with the original project objectives in the business case
- Answer the questions:
  - “Is the business case being achieved?”
  - “Are appropriate measures of success being monitored and achieved?”
- Evaluate project proposals to see if the proposals selected represent the best investment of funds and resources and were within the proposing firm's capability and capacity to deliver
- Evaluate staffing and allocated resources (staff and consultants), to see if they align with existing procedures/execution plans and aspirations (skill level, experience, expertise, and numbers)



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- Evaluate performance in controlling progress, scope, risk and financial contingencies
- Review the stakeholder's commitment to the project as well as their awareness and involvement in overcoming obstacles and managing change
- Review planned vs actual outputs, (plant and labor) and the benefits and value of any deviations identified against both the original plan and any revised expressly stated expectations
- Ensure the project management team is focused on and is 'Steering' the project into the organizations core services (Oil refining, Drug production, microchip production, sludge treatment, gas storage, manufacturing, etc.)

The goals and benefits of the audits are many, but should assist the project team in identifying and removing obstacles, managing critical success factors, and identifying weaknesses or bottlenecks in the organization's project delivery capability - resulting ultimately in the ability to deliver projects in less time, for less cost, with greater certainty and less risk to the organization's core services.

**Why do I need a project health-check?**



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Project Audits are required for companies subject to the Sarbanes-Oxley Act (SOX) as a regulation to protect shareholder. A recent survey<sup>9</sup> indicated that 61% of South-American, European and Asian companies are "totally prepared" for SOX implementation.

Although 80% of European companies surveyed consider that SOX is an adequate response to the main risks by strengthening their internal control systems, 56% find that the costs derived have not been compensated for by the benefits expected. 85% believe that the workload is noticeably more significant than initially predicted. Publically traded organizations still carry capital projects in-progress as assets, while construction and engineering firms often report outstanding construction claims and disputes in arbitration or litigation as deferred income or assets, often overstating the likely net return.

The Sarbaines-Oxley Act, passed in 2002, was written in direct response to the well publicized corporate financial scandals involving Enron, Tyco, WorldCom, and others. SOX requires corporate auditing committees, as part of the governing board of the company, to appoint Chief Audit Executives (CAE) to keep the board informed of the company's performance and compliance with SOX, and corporate governing policies. Auditors and CAEs are becoming more interested in construction. It has been noted that Construction contracts are at a high risk for fraud and contract administration mismanagement.

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<sup>9</sup> Mazars worldwide survey on the Sarbanes Oxley Act, 2006



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While some companies see SOX compliance as a nuisance, others see it as a potential profit center, an opportunity. Savings resulting from independent audits can easily generate sufficient value to offset the cost of the audit.

GREYHAWK's staff has implemented project audits for government agencies and private CAPEX/PFI/PPP consortia as part of the overall Project Control Cycle, which is consistent with, accepted methods of implementing continuous improvement<sup>10</sup>. Suggestions and observations resulting in improved processes and procedures often come from external independent observers, regardless of whether the review is carried out for mandatory or voluntary reasons. The goal of the sponsor implementing an audit should be to:

- Transparently identify the relationships between all internal and external groups,
- Identify improvements to the flow of information regarding the project to all stakeholders,
- Ensure informed decision support systems are in place (time, cost, scope, risk, safety, quality),
- Ensure the appropriate review of issues encountered is occurring in a timely manner,
- Review the effectiveness of significant changes to project procedures,
- Review the effectiveness of significant changes to management staff or key project participants,

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<sup>10</sup> Six Sigma, Kaizen, Deming Cycle and Lean Construction are all models for continuous improvement of quality and efficiency.



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- Enhance awareness and benefits of using early warning systems and event tracking systems,
- Ensure that required approvals are sought and obtained before implementing change, and
- Improve compliance with procedures, design parameters, and statutory obligations

The financial benefits of carrying out an Independent Project Review are not immediately realized. Increases in efficiency, productivity, and effectiveness of the existing staff and procedures will result in financial savings, enhanced value to shareholders, and greater likely-hood of a successful project delivery. The most important

benefit is the avoidance of litigation, cost over-runs, and other surprises resulting from failure to adhere to processes and procedures governing the conduct of the delivery team and senior management.

**Identifying Troubled Projects**

The key to preventing a troubled project from occurring is establishing systems which assist in recognizing the early warning signs. This also requires vigilant attention to detail surrounding both the construction site and its administration, as well as in maintaining effective communications with

contractors and project managers. There are many warning signs, some more obvious

*The use of objective foresight and risk-informed decision making, will increasingly displace the subjective methods employed by the chain of command.*

*No institution can escape the growing, relentless legal consequences of rule-based project governance*

Corporate Governance of State-Owned Enterprises, 2005  
William L Livingston



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than others, that can signal that a project is headed for trouble. An experienced project manager will discover these 'hot spots' before they cause irreparable harm.

### **Warning Signs**

Some of the most effective tools available to an audit team on a construction project are the same project controls methods that every effective project manager should have at his disposal, including;

- CPM - Critical Path Method Scheduling
- WBS - Work Breakdown Structure
- EVM - Earned Value Management
- VM/RM - Value Management / Risk Management

*Experience and Intuition*  
*Open Communication*  
*Good Accounting Systems*

CPM Scheduling and Risk Management have been discussed in detail in the slides and in my other paper “Managing Change”. The following sections address the Work Breakdown Structure and Earned Value Management systems, and how they apply to project audits and performance assessments.

### **WBS – Work Breakdown Structure**

Any well managed project must have a clearly defined scope. This is a universal truth, regardless of what is being constructed, developed or maintained. The Work Breakdown



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Structure should be the common thread that allows the project team to perform, monitor, and manage the work, connecting the management of both the time and money required to complete a project. The WBS allows clear cross referencing of tasks to their associated cost, or cost account. To employ the WBS methodology, a project must be broken down into small, manageable discrete elements, as follows;

- A discrete statement of work (task)
- A specific time frame (scheduled start and finish dates)
- An assigned budget

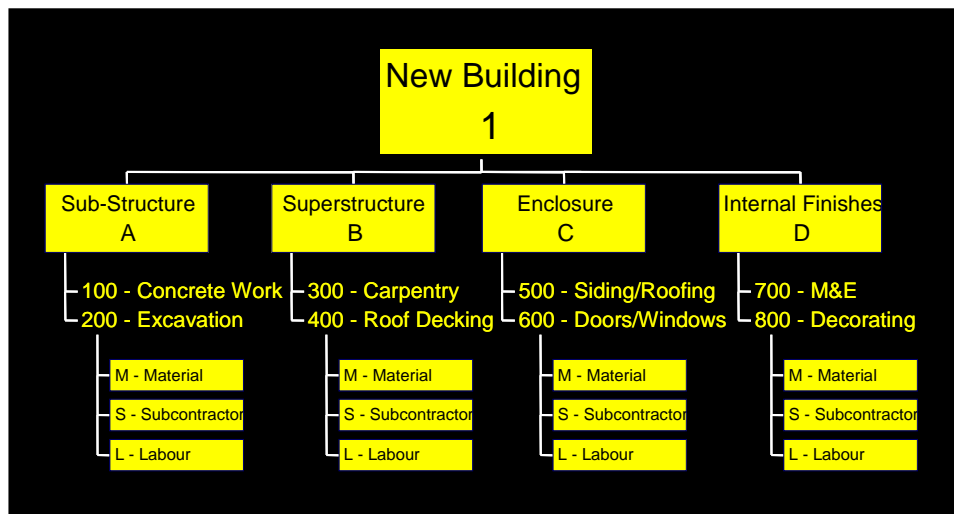
The WBS is the method of defining and organizing the total scope of a project, using a hierarchical structure of elements. The first two levels of the WBS (Level 1 and Level 2) define a set of planned outcomes that collectively and exclusively represent 100% of the project scope. At each subsequent level, the children of a parent node collectively and exclusively represent 100% of the scope of their parent node. A well-designed WBS makes it easy to assign any project activity, and any one cost code to one and only one terminal element of the WBS. Use coding to sort, group, and filter information pertaining to 100% of the project scope, the WBS allows reporting of cost and time performance by WBS level, as well as by;

- By responsible party
- By area
- By discipline
- By system/process

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- By vendor package

A question to be answered in the design of any WBS is when to stop dividing work into smaller elements. If the WBS terminal elements are defined too broadly, it may not be possible to track project performance to a high enough level of detail to allow management to make effective decisions when cost over-runs or delays are encountered. WBS coding allows management to isolate whether cost over-runs are due to labor costs, material costs, or sub-contractors costs. WBS coding can also assist in identifying which trade is running behind schedule, even if it is under-budget. An overly detailed WBS however, can become too convoluted to manage effectively. The WBS can be treated as a live tool, progressively elaborating, with detail being added as designs are finalized and subcontractors are procured. Depending on the level of detail, and the design of the WBS, it is a very powerful reporting and project management tool. A Sample WBS is provided below.





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Using this WBS structure, we can assign resources, units, outputs, and total quantities to arrive at an overall required duration and cost for each Activity in the CPM schedule.

<b>Activity</b>	<b>Resource</b>	<b>Units</b>	<b>Output/Day</b>	<b>Total</b>	<b>Duration (Days)</b>
300 Grade Beam A1	Concrete	M3	300	3,000	10
300 Grade Beam A1	Carpenter	HR	100	1,000	10
400 Finishes – Room 301	Paint	M2	200	800	8
400 Finishes – Room 301	Decorator	Hr	10	80	8

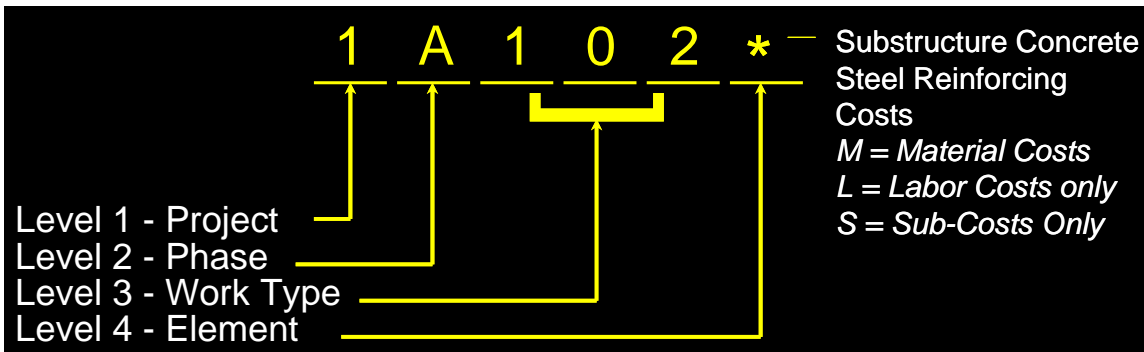
These are all coded against the WBS data-base to ensure uniformity for similar tasks included in the schedule. Most importantly, budgets for Units, Hours, and Dollars are entered into the WBS library for tracking and analysis against actual expenditure.



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Activity	Resource	Units	Cost/Unit	Total Units	Budget
300 Grade Beam A1	Concrete	M3	\$100	3,000	\$300,000
300 Grade Beam A1	Carpenter	HR	\$40	1,000	\$40,000
<b>Sub-Total \$340,000</b>					
400 Finishes – Room 301	Paint	M2	\$10	800	\$8,000
400 Finishes – Room 301	Decorator	Hr	\$40	80	\$3,200
<b>Sub-Total \$11,200</b>					

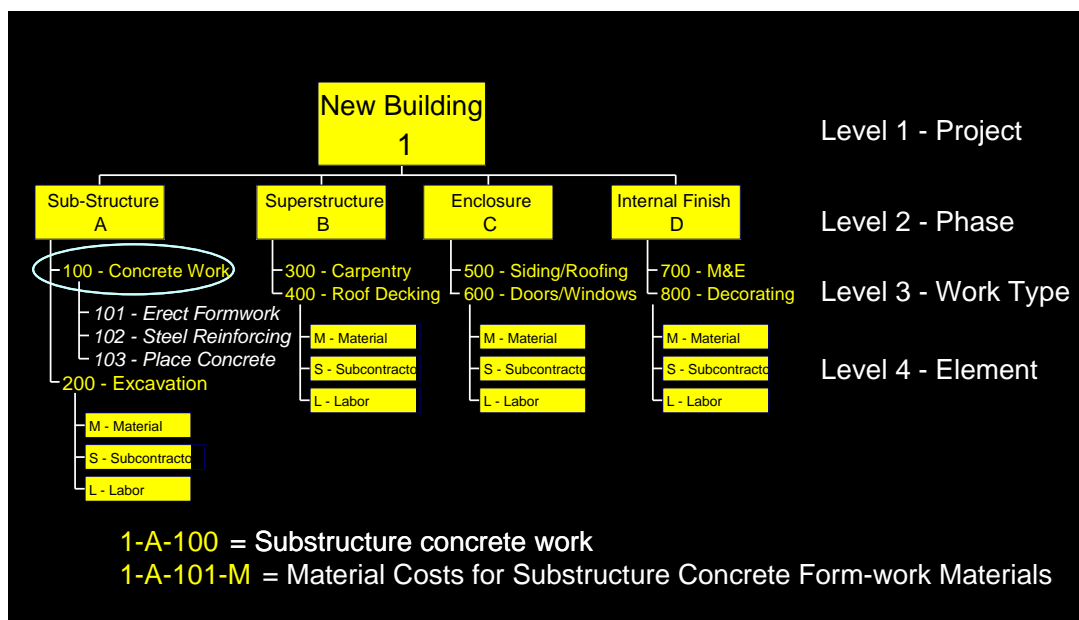
The hierarchal coding is actually very simple. Using the above example, we can assign code values to each Level to allow a dictionary to be created. This dictionary will allow the sorting and grouping of all budgets and expenditures tracked in the WBS.





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For example, if we wanted to isolate Substructure Concrete Work, we would refer to New Building (1), Substructure (A), Concrete (100). If we wanted to isolate the planned budget or actual (cost, units, hrs) for the materials involved in the formwork used in substructure concrete, we would isolate New Building (1), Substructure (A), Concrete Work (1), Concrete formwork (01), Materials (M). This is illustrated below.



WBS codes are traditionally kept to 10 digits, but can be as long as the data-base will allow and the users can practically manage. In addition to being integrated with the CPM and Cost Account system on a project, the WBS structures can be integrated with cost accounting systems, Organizational Breakdown Structures (OBS), Funding Structures, and a vast array of other cost management and Project Management systems. Using the hierarchy of the Levels in the WBS, a coding structure can be created, and whether



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managed in a spreadsheet, or inter-relational data-base, budgets, costs, units, etc., can be grouped, coded, and filtered to analyze budgets against actual expenditure for any cross section of Phases, Work Type or Elements.

Using the WBS in assessing the performance of a project will allow labor, materials or supplier costs to be analyzed discretely, across all Work Types, or in only one area of the project. WBS is most useful when employed in conjunction with an Earned Value Management System to not only to assess the current state of the project, but to also make forward projections based on past performance.

### **Earned Value Management**

Earned Value Management (EVM) is a highly underutilized tool which is readily available to anyone employing CPM techniques. EVM is the only tool able to combine measurements of actual performance (% of planned work completed), both critical and non-critical schedule performance (behind/ahead of schedule), and over-all cost performance (under/over budget) in one measurement reporting system. EVM is also the



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most effective tool available for identifying trends which can act as an early warning of future cost or scheduling performance problems.

EVM acts as a solid grounding for the cost/schedule budgets to prevent scope creep. Scope can not be added with out a cross reference to a planned budget and a WBS item. Any attempts to add scope will also require adding associated costs/units/hours to the WBS budgets. EVM has been around since the 60's and has become a discrete branch of project management and cost engineering. Contemporary EVM protocols are based on the DoD's criterion-based approach, which specified a prescriptive a set of 35 criteria, referred to as Cost/Schedule Control Systems Criteria (C/SCSC). Although specified in many government contracts, the technique was often overlooked by both government agency staff and contractors, due to the burden it placed on the administrative effort of both Project Management teams. Advancements in information technology however, have significantly reduced the administrative effort required to implement EVM, by virtually eliminating the need for manual data collection and entry. Modern project management software packages, such as those from Primavera Inc., integrate accounting systems with the project schedules, thus allowing users to easily generate earned value reports without having to manually gather data.

EVM is a known part of the ANSI standards (ANSI EIA 748-A). The Project Management Institute (PMI) now includes a sections explaining EVM in its project management guide otherwise known as the Project Management Body of Knowledge (PMBOK). Many government agencies now require EVM as a matter of course, along with CPM scheduling requirements. Additionally, the Association for Advancement of



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Cost Engineering (AACEI) now offers an Earned Value Professional(EVP) certification to cost engineering and project management professionals. Thus, EVM is now one of the fundamental standards of project management.

The technique is basically a mathematical analysis of contemporaneous project progress and expenditure (cost, hours, units, etc...) compared to originally planned progress and budgets. To perform EVM, one needs a cost or resource loaded CPM schedule update, as well as a baseline CPM schedule with the same cost/resource loading. Resources which can be analyzed using EVM include (but are not limited to);

- Manpower (hrs)
- Construction equipment
- Money
- Materials
- Permanent plant equipment

Steps to performing an earned value analysis are as follows;

First *establish* Budgeted Cost of Work Scheduled (BCWS)

Second, *determine* Actual Cost of Work Performed (ACWP)

Next, *calculate* Budgeted Cost for Work Performed (BCWP)

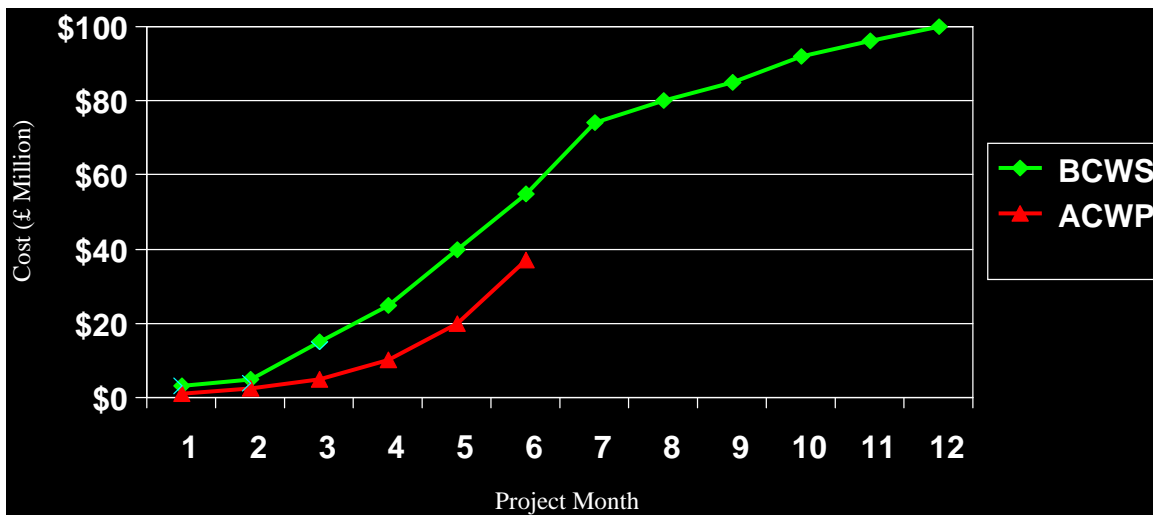


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From these values, we can calculate various performance variances and indices, including

- SV = Schedule Variance
- SPI = Schedule Performance Index
- CV = Cost Variance
- CPI = Cost Performance Index

Taking a brief example, the benefits will be obvious. In the following example



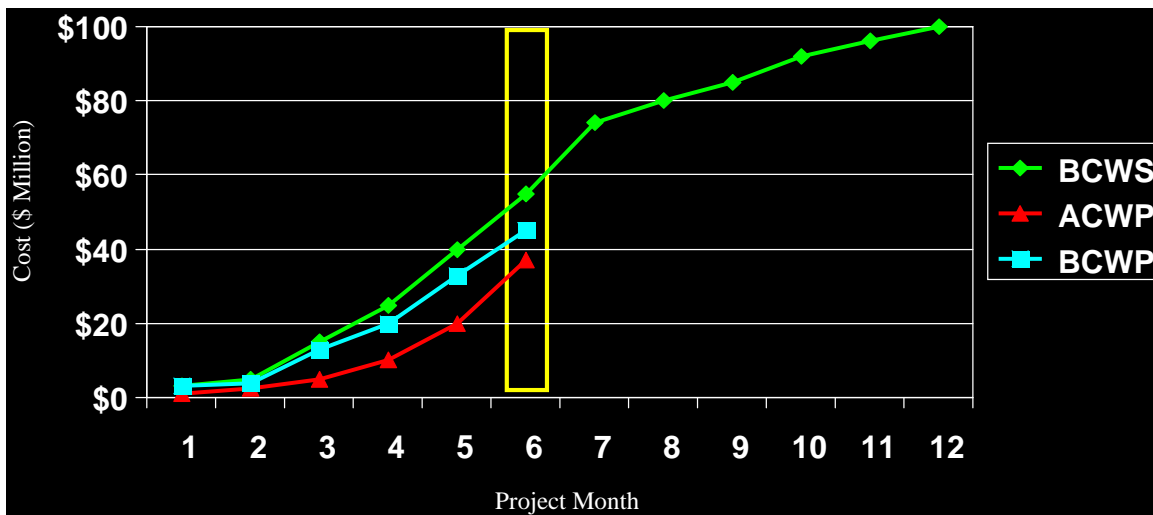
The above curves represent typical cash-flow curves, planned (Budgeted Cost of Work Scheduled) and actual (Actual Cost of Work Performed). These are not sufficient to determine if the project is ahead of schedule, behind schedule, or under or over-budget. All it tells the reader is that this contractor is under budget at this stage of the project. It



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does not indicate whether the contractor is ahead or behind schedule. A more complete picture is required to understand what is causing these curves to deviate.

The measurement of “Budgeted Cost of Work Performed” (BCWP) is the added feature provided by EVM. Let’s assume that our BCWP for our example was \$45M, see below.



In this example, we should have spent \$55M, but we have only spent \$37M. However the BCWP was \$45M. The figure of \$45M is arrived at by cross referencing the WBS coding for each item (completed or in-progress CPM activities) with their budgeted values. For this example, the performance is as follows.



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- We are behind schedule (we should have earned \$55M of progress but we only 'Earned' \$45M of progress).
- We are under budget (we only spent \$37M to earn \$45M)

These are simple variances, and not trends. Because we are going to have to spend more money to recover the schedule slippage, the amount of savings we achieved (\$45M - \$37M) is likely to deteriorate over the balance of the project. Our performance indicators are as follows.

- Our Cost Performance Index (CPI) is equal to  $BCWP/ACWP$ , or  $\$45m / \$37m$ . This equates to 1.22 (greater than one)
- Our Schedule Performance Index is determined by  $BCWP/BCWS$ , or  $\$45m / \$55m$ . This equates to 0.8182 (less than one)

Had our indicators been equal to 1, we would have been exactly on target. A value greater than one indicates we are doing better than planned. A value less than one means we are doing worse than planned. The Performance indices provide some statistical guidance on how to predict the likely cost and schedule over-run based on trends measured using EVM. These are referred to as Estimates At Completion (EAC) values. Estimating EAC can be done through straight line analysis (assuming no deviations from the plan), or statistical analysis, relying on EVM Performance Indicators.



The first method is to simply divide the total budget with the current CPI.

$$\text{EAC based on CPI} = \text{Total Budget} / \text{CPI} = \$100\text{M} / 1.28 = \$81.97\text{M}$$

If only costs were a factor, this would indicate that if we continued to save costs, and perform better than planned, financially, we could finish under-budget. However, when project delays are present, they rarely go-away without a financial impact. To recognize the fact that additional funds are likely to be required to correct the shortfall in scheduling performance, the second method should also be applied to arrive at a range of possible EAC's.

$$\text{EAC based on SPI} = \text{SPI} * \text{CPI} * \text{EAC} = .8182 * 1.28 * 81.97 = \$99.82\text{M}$$

Based on this analysis, an additional \$18M might be required to recover the schedule slippage identified. These are statistical ranges only, but are nevertheless indicative of overall performance, and are useful trends which an audit team can use to determine the general health of a project. EVM can be applied to the entire project, individual contracts, or individual WBS items. For EVM to succeed, there must be a buy-in from both the site project management team and the contractor's senior management team. Actual costs data must be timely entered into the progress update, along with schedule progress. Also, if the EVM and WBS structure are not scaled appropriately to match the size and complexity of the project, it may be insufficient to assist the team, or too cumbersome and costly to maintain.



## **Troubled Project Red Flags**

### **1. Delays:**

Delays culminate during periodic reviews of the work schedule or when contractors request time extensions. Less apparent but just as costly, contractors may reduce the number of workers on site. Any downward deviation from the contractor's planned resource levels, or high levels of turn-over of staff, are all warning signs that need to be investigated further.

A disorderly construction site can also signal delays and lack of attention to detail when a contractor is in crisis management mode. Improperly cared-for equipment and messy storage of materials can be both symptoms and causes of troubled projects.

### **2. Change Orders**

Requests for change orders, long standing disputed issues, and claims can lead to project performance problems. A large backlog in either the number or dollar value of change orders in progress, are both a sign of trouble, and a contributing factor. When a large number of change orders are present on a project (by dollar value and number) the process of integrating the additional or changed work must be managed by adding resources, extending the project completion date, or otherwise agreeing on the impact on existing work.



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Generally, a backlog of unapproved change orders will meet one of three criteria.

- Change Orders might be not be approved and issued due to poor contract administration or lack of funding approval by the Owner;
- Others may be delayed because the cost is disputed though entitlement is agreed;
- Claims may be delayed because of a dispute over entitlement to payment of additional sums under the contract.

Claims for time extensions and delay damages usually fall under one of several conditions.

- Scheduling is a common cause of disputed claims because of inability to agree to the extent of delay or acceleration required to maintain the contract schedule.
- Labor rates may be a factor as a result of wage rate escalation, productivity losses or disagreements over the amount of additional labor required.
- Lastly, the cost of extended overheads, site and home office, will be an issue that rarely gets resolved on troubled projects.

If these issues are present and not resolved soon after the effect of the delaying event is known to all parties, it is likely the troubled project will limp along, plagued by delays and unresolved disputes through to completion.



### **3. Communication**

Lack of effective and transparent communication is also both a symptom and a cause of a troubled project. While we would expect contractors, project engineers and construction managers working on the same project, on the same site, would communicate easily, frequently and clearly, often that is not the case. Normally, most owner/contractor/supplier communications originate at the site, and are communicated between the owner's on-site representative and the contractor's field superintendent. This is effective communication and aids in quick, onsite, real-time decision making, and maintains the momentum of the project. When correspondence both originates, and is communicated between the home offices of both the owner and contractors staff, this could either be a warning sign that trouble is ahead, or that the project is proceeding unimpeded despite the lack of effective site-based communications. Additionally, warning signs could include increasingly formal, adversarial tone of language between contractor and architect/engineer or construction manager, as well as letters from or copied to attorneys or bonding companies working on behalf of one of the parties. When a project is analyzed forensically, it is obvious when the parties had a falling out, simply by looking at the tone, frequency and length of the letters and communications.

### **4. Quality**



*Have you taken your project's pulse lately? Project Health Checks*

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Habitual declining workmanship and material standards are yet another indication of problems to come. Experienced project and construction managers often have to manage substitutions (materials and equipment) during a project. When contractors or subcontractors submits a large number of requests for substitutions, it most likely indicates that either the originally specified materials were unavailable (a problem in and of itself) or that the contractor is taking short-cuts or value engineering additional profit into the project. Problems in the project's design will also surface with a growing number of requests for information from contractors, subcontractors and/or suppliers. This is not a 'red flag' in every case, as contractor's have been known to use architects and engineers as a library of sorts, using the RFI process to find information already available in contract documents, drawings, bulletins or specifications.

Recentl economic woes have also resulted in frequent financial problems culminating in liens against the property or payment demands made directly to the owner. These are signs that the prime is experiencing cash flow issues and is not paying his subcontractors or suppliers. In extreme cases, subcontractors will opt to abandon the project rather than spending more money buying materials and supplying labor in the risk of not getting paid.

Recent research confirms that troubled public projects are responsible for millions of additional cost to taxpayers. The study's findings raised the following points<sup>11</sup>:

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<sup>11</sup> ESI International and Independent Project Analysis (IPA), 2008



*Have you taken your project's pulse lately? Project Health Checks*

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- Only 34 percent of projects succeed.
- An average of 15 percent of all projects fail.
- Projects that are considered “challenged” or “troubled” - usually due to cost or schedule overruns—account for 51 percent of all projects.
- The lost dollar value for U.S. projects in 2002 was estimated at \$38 billion, with another \$17 billion in cost overruns.
- The total project waste in 2002 was \$55 billion - against \$255 billion in project spending<sup>12</sup>.
- 59 percent of organizations in the Asia-Pacific region had at least one project failure with an average cost of \$8.9 million.
- In Africa, Europe, and the Americas an average of 56 percent of the organizations reporting at least one project failure with an average cost of \$11.6 million<sup>13</sup>.

The study confirms that troubled projects are not a local, but a worldwide affliction.

***Project Health Check – How many symptoms does your project have?***

- The contractor got off to a very slow start on-site.
- Equipment ordering or detail design has fallen far behind schedule.
- Subcontracted work is being assigned late or falling behind schedule.
- The owner-furnished equipment or information is arriving late or incomplete.
- Numerous changes have not been negotiated or agreed-upon.
- The contractor and/or owner is having cash liquidity problems.
- The owner continues to request substantial changes late in the project.

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<sup>12</sup> Source: The Standish Group 2003

<sup>13</sup> KPMG International Survey 2003



*What's your score?*

## **Diagnosis**

- ONE:** You are lucky, get back to work.
- TWO:** The contract is not really troubled, but the situation can deteriorate rapidly if both parties do not maintain good contract management practices.
- THREE:** The contract is potentially heading for trouble. However the impact can be minimized by avoiding the need to address further requests for changes, resolving or canceling unauthorized changes, and pushing for open communications at site level.
- FOUR:** You officially have a troubled project. Significant problems are not just a potential threat, they are real. Contract overruns of cost and schedule are almost certain, but can be minimized by application of proven contract management practices by all parties. Recruit outside and independent contract management support (not just project managers) to support your existing team.
- FIVE:** Definitely call in the experts to help! First, to stabilize the rapidly deteriorating contractual relationships, second, to identify the means for rescuing the remainder of the project, and third, to start documentation for the potential post-delivery claims and counter-claims.
- SIX:** If you haven't already, call a construction lawyer too. There's a strong potential for one party or the other to allege contractual default. Legal counsel will help minimize that possibility or help you respond to it if it occurs.
- SEVEN:** *Abandon Ship!* The contract is failing and may not be completed under the current contract with the existing team. Litigation or arbitration is likely if mediation fails.