Addis College

Post Graduate Program

Construction Engineering and Management

CEM 6204

Construction Risk and Change Management

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CHAPTER FOUR

Change Management in Construction

Change Management

Why Change Management?

We are living in a time of great change.

To survive and thrive, organizations must successfully manage large and complex change at increasingly rapid rates.

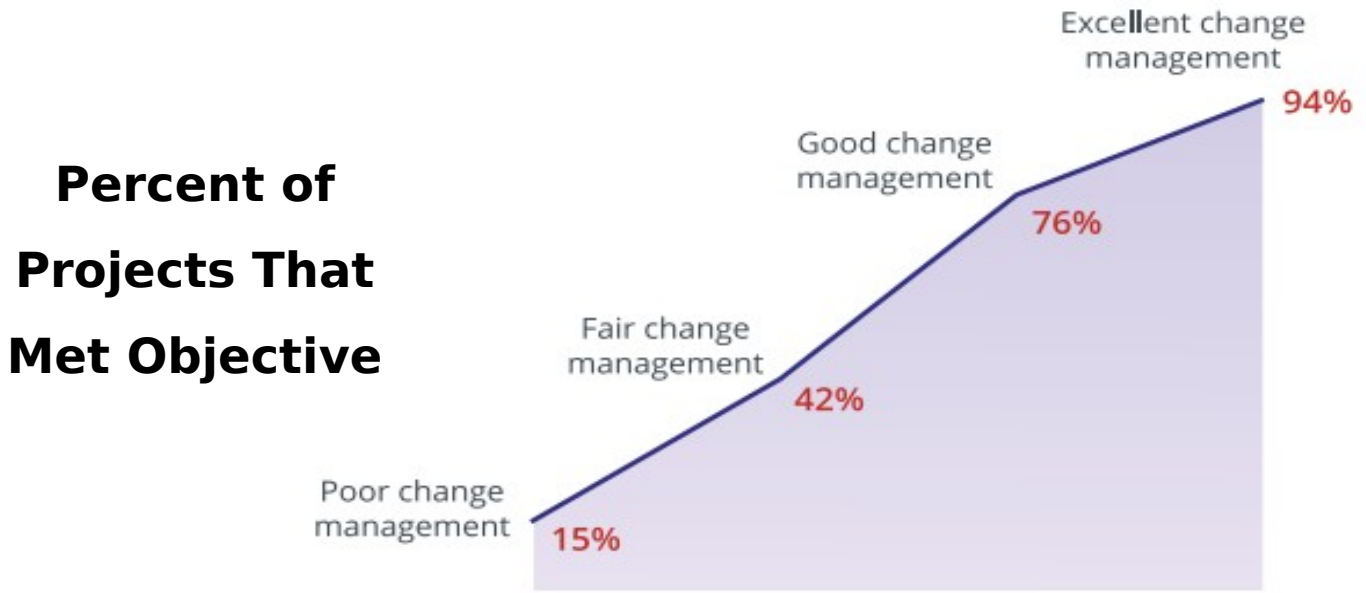
Unfortunately, many organizations leave project success to chance.

Change Management

Why Change Management?

Change Management Increases the Likelihood of Success.

The better we apply change management, the more likely we are to meet project objectives.



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Why Change Management?

INITIATIVES WITH EXCELLENT CHANGE MANAGEMENT ARE 6 TIMES MORE LIKELY TO MEET OBJECTIVES THAN THOSE WITH POOR CHANGE MANAGEMENT.

Initiatives can impact the following aspects of an individual's job:



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What is Change Management?

Change Management: the application of a structured process and set of tools for leading the people side of change to achieve a desired business outcome.

Change management is both a process and a competency

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Change Management as a Process

Effective change management follows a repeatable process and uses a holistic set of tools to drive successful change.

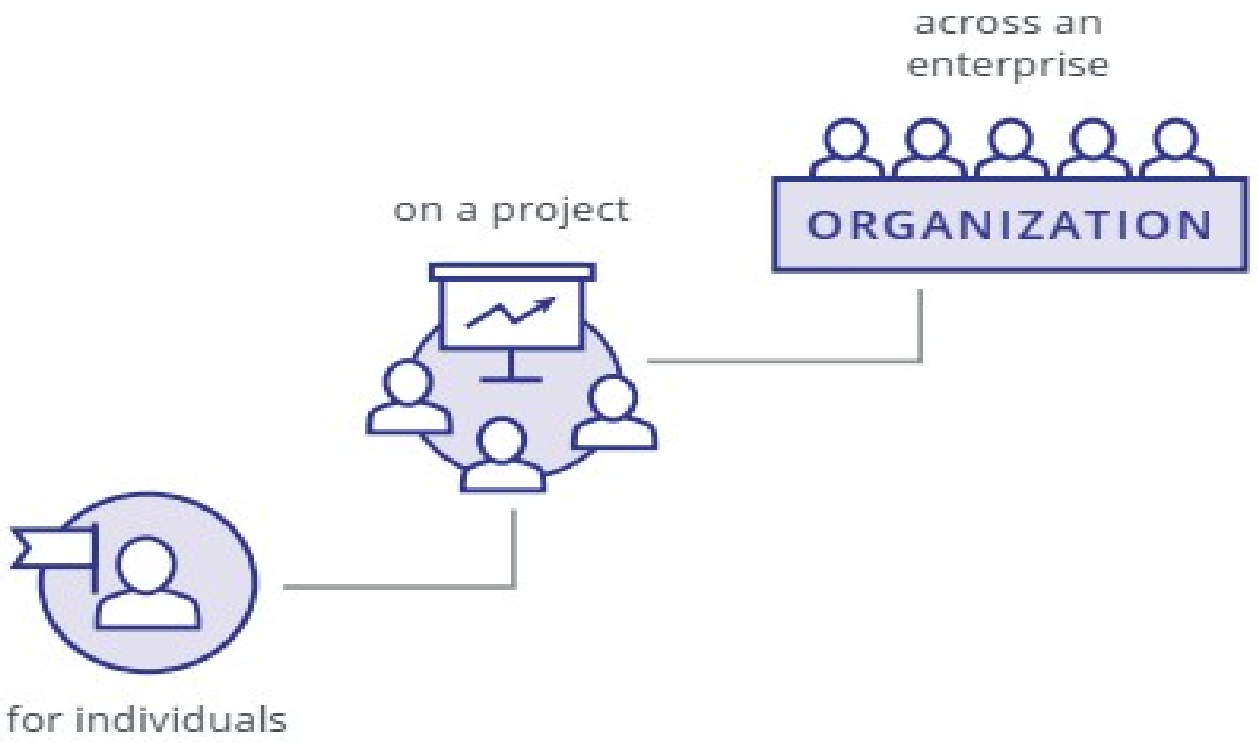


Change Management as a Competency

As a competency for leaders, change management is a set of skills that enables change and creates a strategic capability for increasing organizational effectiveness.

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Change Management Happens at Three Levels



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Change Management Happens at Three Levels

- **For individuals**: to enable people's success by supporting them through their personal change journey
- **On a project**: to increase outcomes and return on investment by driving adoption and usage
- **Across a company**: to deliver strategic intent, mitigate saturation and improve agility by embedding change management

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Project Change: Definition

- Project overruns result from Change:
  - Any event that results in a modification of the original scope, execution **time, cost, and/or quality** of work

Original Design



As-built



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Control and Certainty

- Change management maintains **control and certainty**:
  - If you don't know or haven't controlled what is going to be built; **how do you know when it will be delivered and how much it's going to cost?**

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Change: Causes of Change

➔ Changes to the project can occur for various reasons, for example:

- Differing Site Conditions;
- Changed Conditions including Regulatory Changes;
- Added/Deleted Scope;
- Information missing from the contract documents;
- Errors and/or Omissions; and
- Project Delays.

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Effects of change

- Changes can have undesired consequences:



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Change Process: Overview

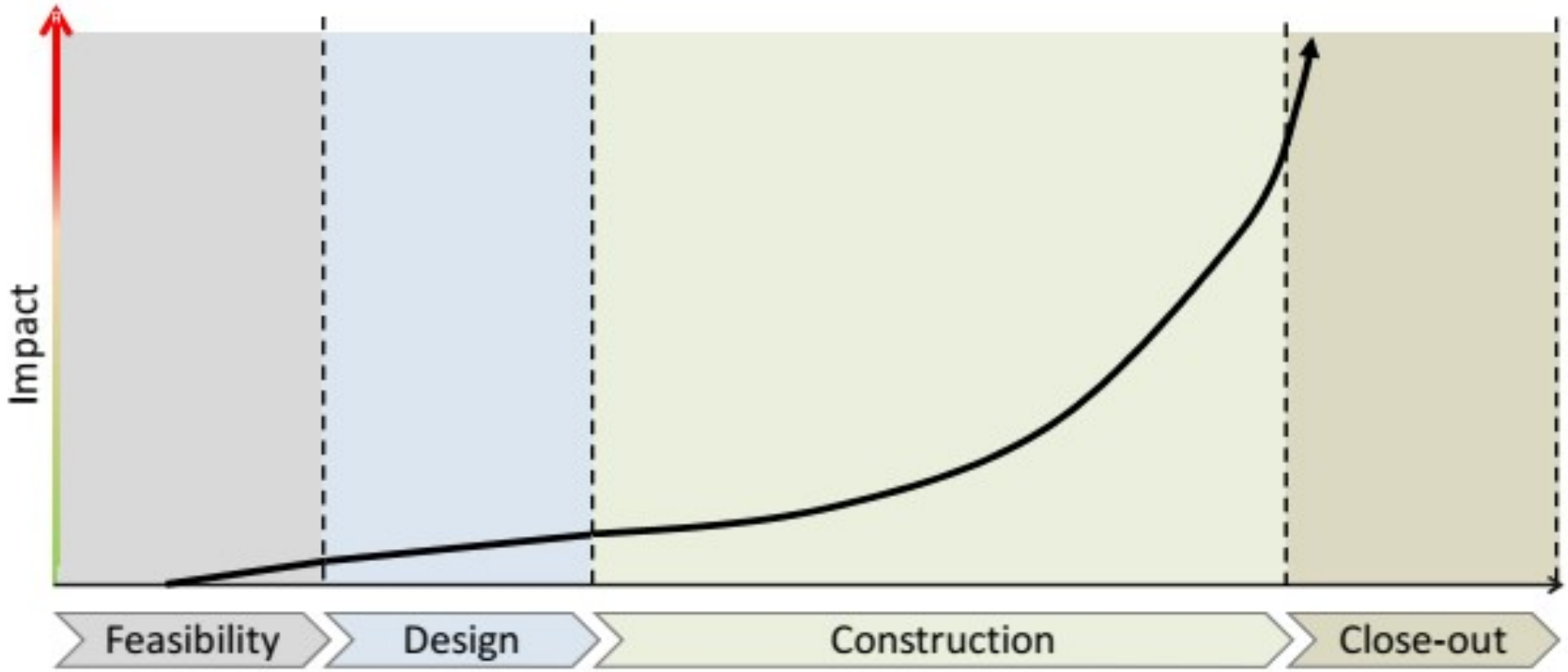
- How to manage change:



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Identify Change: Time critical

➔ The timing of change often effects its impact:



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Change Process: Overview

- How to manage change:



- Those effected by the change need to assess its implications

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Underestimated Change

- The consequences of change are often underestimated.
- What if changes are underestimated?
  - The project may suffer delay to completion and additional costs.

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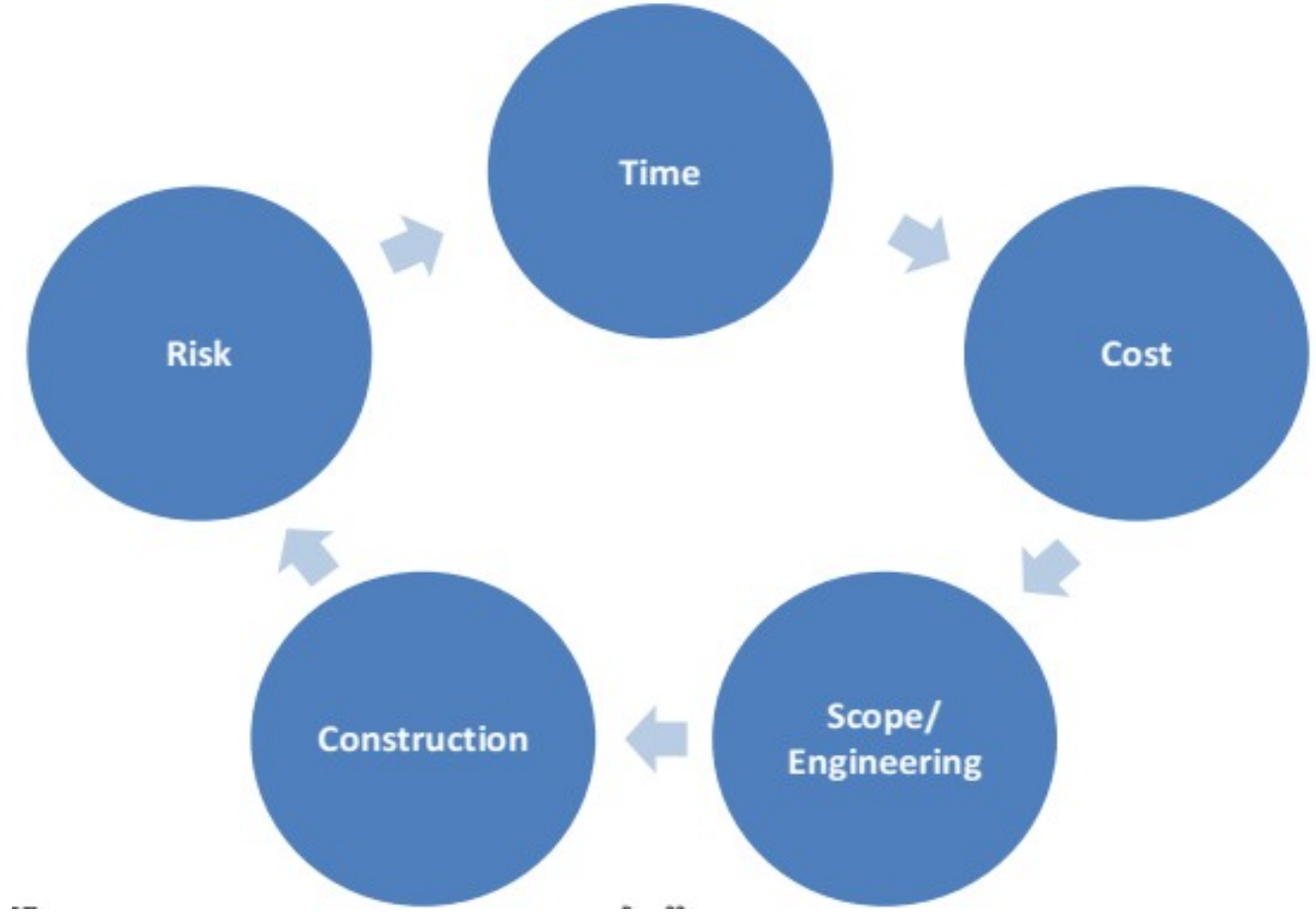
‘The Triple Constraint’

- Change can affect the triple constraint:



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Change requires collaboration



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Change requires collaboration



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Change Process: Overview

- How to manage change:

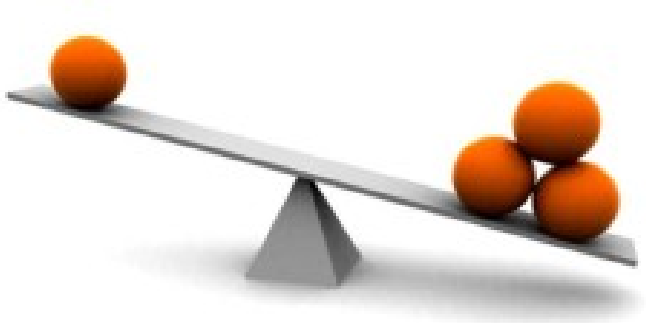


- Approval

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Approval - Balancing Act

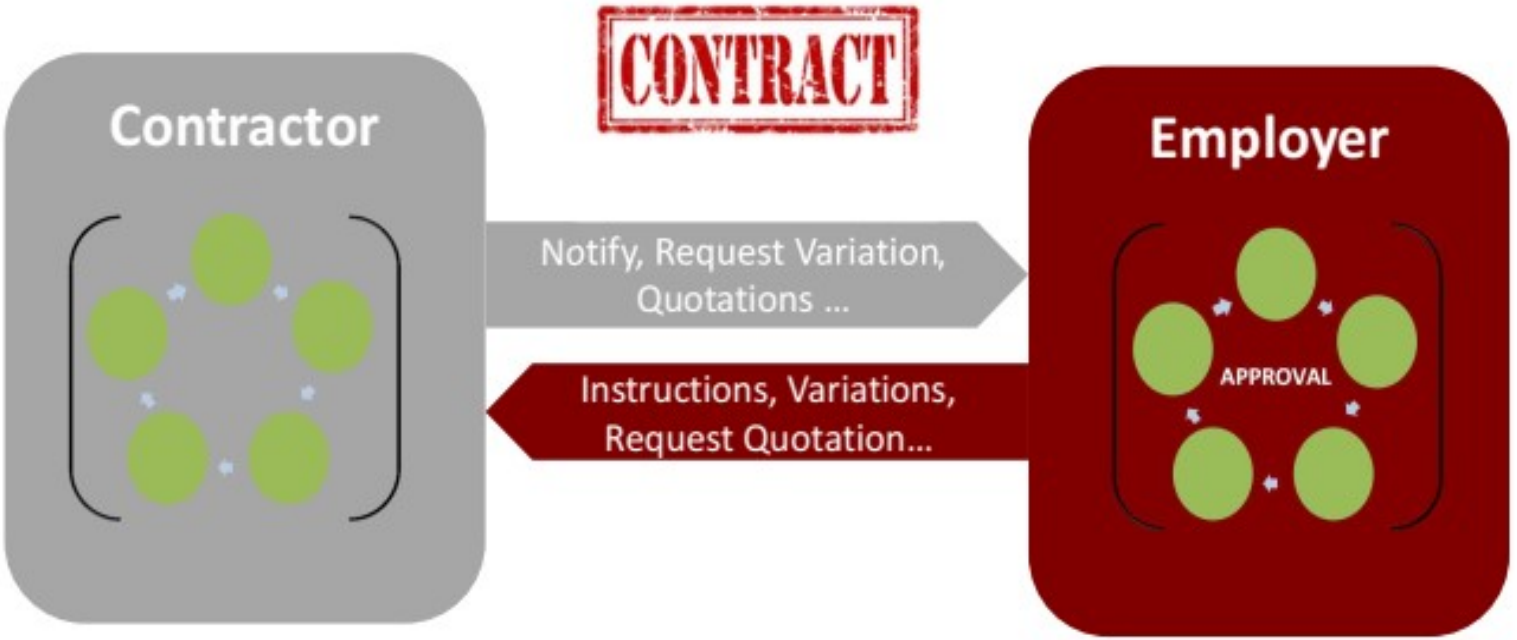
- Approval process needs to balance control and flexibility:
  - Approval processes vary between organization.
  - However, the greater level of control often means less reactive the change.



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Change Communication

- Change communication forms part of the contract:



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Change Flexibility

- Construction contracts usually allow the employer to require the contractor to perform variant work.
  - The **contract foresees change** and **provides** a mechanism to facilitate it without the parties having to renegotiate the contract terms.

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Cost of Change

- The costs of performing changed work consist of both:
  a. Those direct costs related to carrying out the changed work; &
  b. Those costs arising from the interaction or incorporation of the changed work and the existing work
- Most forms of contract recognize and provide for the valuation of work relative to the circumstances under which it is being executed.
- That second aspect is often significantly underestimated or undervalued by both Contractors, Employers and their

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Project Change

- Being able to demonstrate:
  - An activity required more resources; or
  - An activity cost more to complete; or
  - Productivity was less than planned.
- **Does not prove disruption.**
- The majority of potential causes of reduced productivity rest with the Contractor and are under his control or at his risk.

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What is Disruption?

- Disruption is loss of productivity, disturbance, hindrance or interruption to a Contractor’s normal working methods, resulting in lower efficiency.
- In a construction context, disrupted work is work that is carried out less efficiently than it would have been, had it not been for the cause of the disruption.
- If caused by the Employer, it may give rise to a right to compensation either under the contract or as a breach of contract.

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What is Disruption?

- Construction contracts have two major types of costs associated with them: fixed and variable.
- Fixed Costs are those costs that the Contractor procures on a fixed price Subcontract or purchase order.
- Fixed costs are inherently lower in risk, because the Contractor has fixed them up front through a contract.
- Risks do exist, such as the financial failure or default of either a vendor or Subcontractor or the installation of defective or faulty work by a Subcontractor or vendor, but the risks are much less than the risks in variable-cost items.

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What is Disruption?

- Variable Costs are items such as the Contractor's labour, equipment, and site overhead.
- Delay claims are related to the extended duration of the project and extended site overhead costs.
- The major variable risk component on a construction project is labour, not extended site overhead costs due to delay.

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What is Disruption?

- Equipment, on certain types of construction such as utility, heavy, and highway construction, can be a significant cost; however, equipment costs tend to be proportional to labour costs. It is uncommon to have significant increases in equipment costs without significant increases in labour costs.

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What is Disruption?

- On many construction projects, the largest single area of cost overrun is related to labour costs.
- That is not surprising given that labour is frequently the largest variable cost for a Contractor.
- Claims involving lost productivity are frequently referred to as disruption claims.

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What is Productivity?

Productivity = Production Output/Resource Input

= 4 m of 4” pipe/labour-hour

Productivity Ratio = Actual Productivity/Planned Productivity

= 3 m per hr/4 m per hr

= 0.75

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Why is Productivity Important?

➔ Hypothetical Project Cost Components

- Labour (40%)
  - ✓ Often the largest cost component;
  - ✓ Often the most volatile cost component
  - ✓ Often the most critical cost component to control
- Materials (40%)
- General Conditions and Indirect Costs (10%)
- Overhead (5%)
- Profit (5%)
- **Total (100%)**

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Why is Productivity Important?

➔ A Model



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How Do You Demonstrate Disruption?

- To demonstrate Disruption it needs to be made visible.
- Focus on the Cause – identify and track through to the effect – quantify that effect and relate it back to the cause.

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How Do You Demonstrate Disruption?

- Disruption exists at the Micro level:
  - Disruption takes place within the working day;
  - It may come down to lost hours or minutes within that day;
  - It may involve men and plant standing idle which is relatively easy to see;
  - Where it is a reduction in efficiency that can be harder to identify and quantify unless you have robust systems in place.

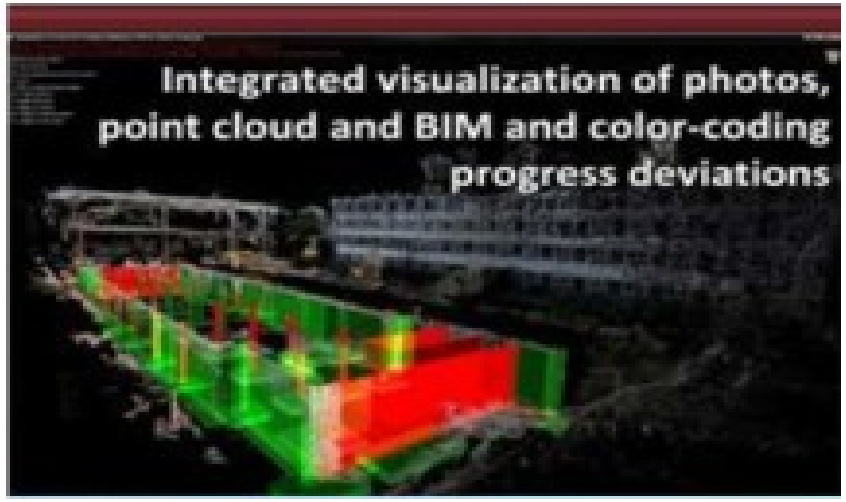
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How Do You Demonstrate Disruption?

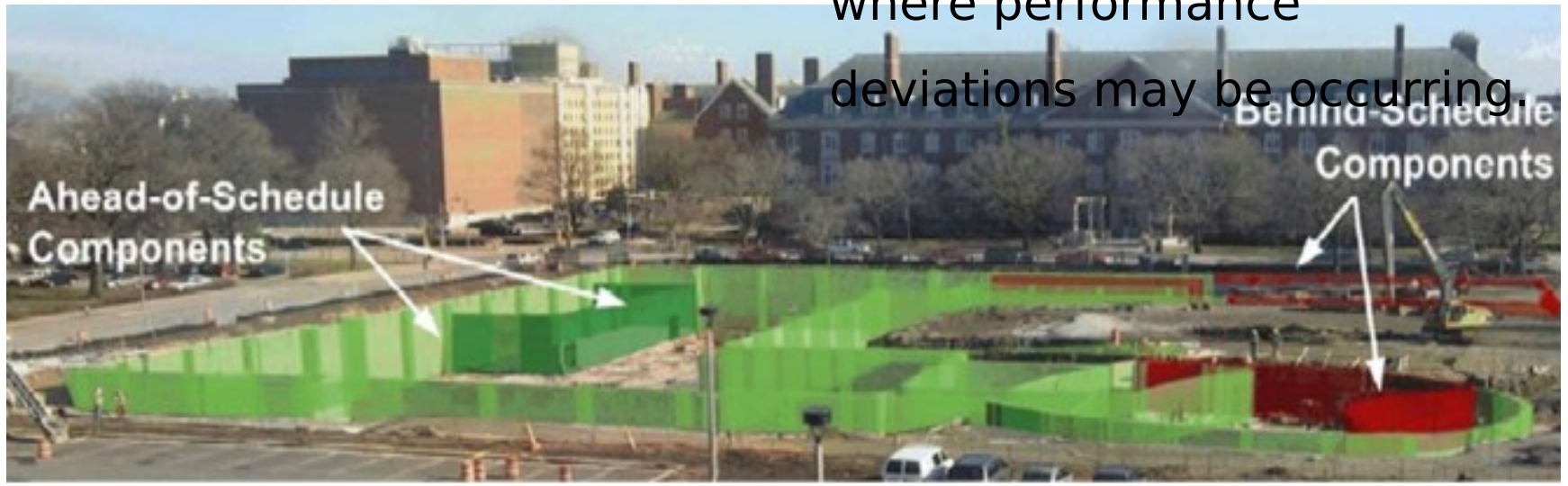
- Sophisticated systems do exist that allow augmented reality modelling that automatically analyses physical progress from digital photographs on large-scale construction projects.
- The 4 Dimensional Augmented Reality [D4AR], is able to geo-spatially store digital pictures of a building in 4D (3D plus time) and integrates the photos with BIM during any and all phases of construction allowing performance of the project in terms of physical progress, cost, and delivery time to be systematically analyzed

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How Do You Demonstrate Disruption?



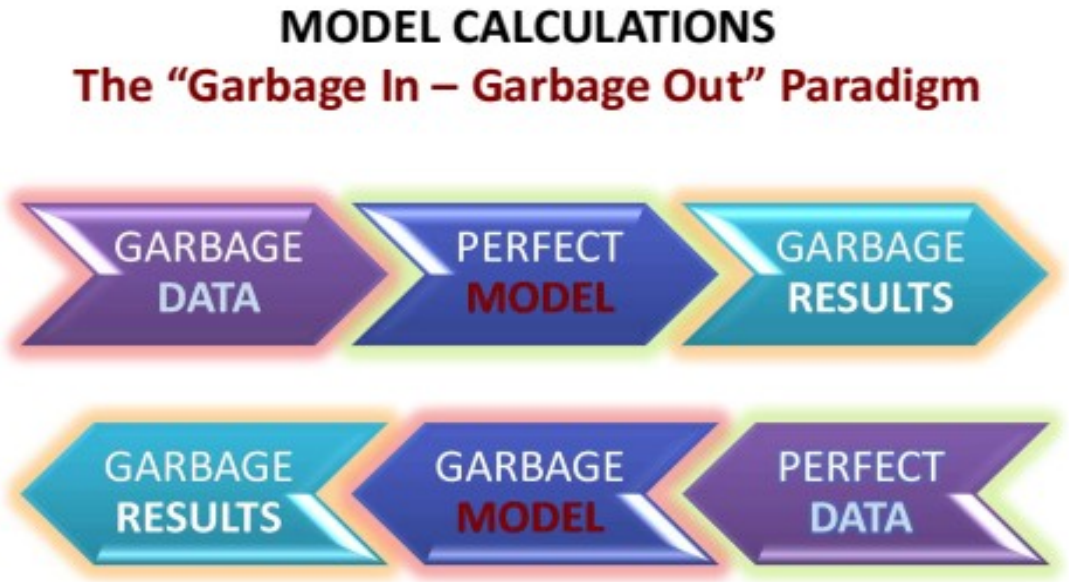
These images show the integrated visualization of photos taken at the construction site, and the colour coding allows someone monitoring the progress to understand where performance deviations may be occurring.



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How Do You Demonstrate Disruption?

- Technology is useful but it is only as good as the information that it is fed: GIGO!



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Methods of Quantifying Lost Productivity

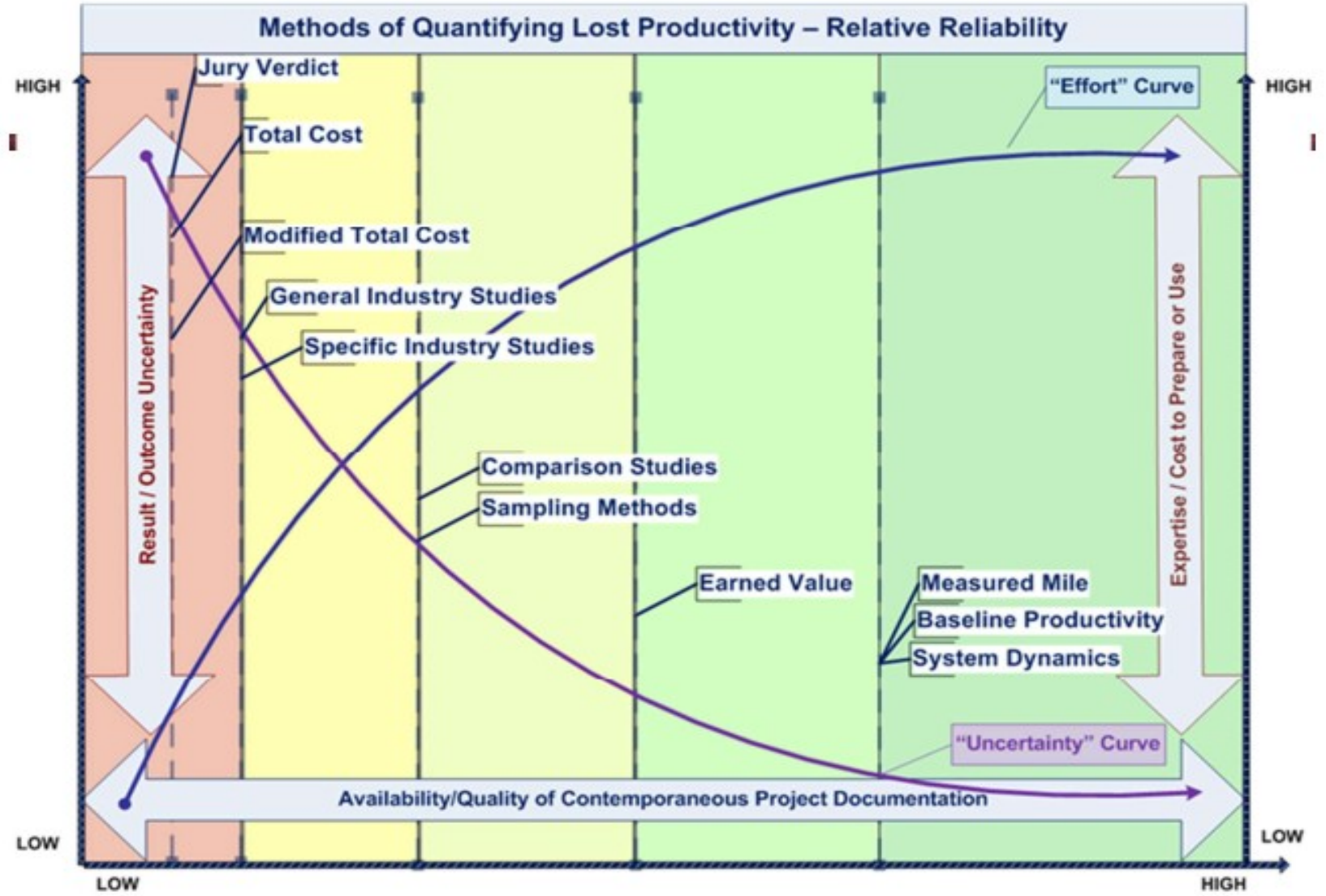
- The construction industry has developed and employed a number of methodologies for estimating lost labour productivity.
- Based on the appropriate data input, these methods can be classified into three major groups; namely:

1. Project practice based;
2. Industry based; and
3. Cost based methods.

The detailed data requirements and corresponding judicial acceptance generally increase as the approach adopted moves from cost based to project practice based methods.

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Methods of Quantifying Lost Productivity



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Methods of Quantifying Lost Productivity

- Where possible the productivity loss should be incorporated into the estimate or valuation for the extra work or change and resolved in that manner.
- The additional cost incurred is part of the change in the nature and circumstances of the work and properly recoverable as a component of the valuation of that change under most forms of contract.
- Demonstrating that component remains the challenge.

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Methods of Quantifying Lost Productivity

- Where disruption claims do end up in a claim situation Tribunals appear to be more favorably impressed by damage calculations related directly to the project in dispute and supported by contemporaneous project documentation.
- Therefore, recommended practice for preparing a lost productivity calculation is to utilize, if possible, one of the techniques listed in the category of Project Practice Based Methods.

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Methods of Quantifying Lost Productivity

- These methodologies are project specific and supported by people and records directly involved at the time.
- That direct relationship to the work and the events in question are what gives the approach its appeal to a tribunal over a more theoretical or generalist approach.

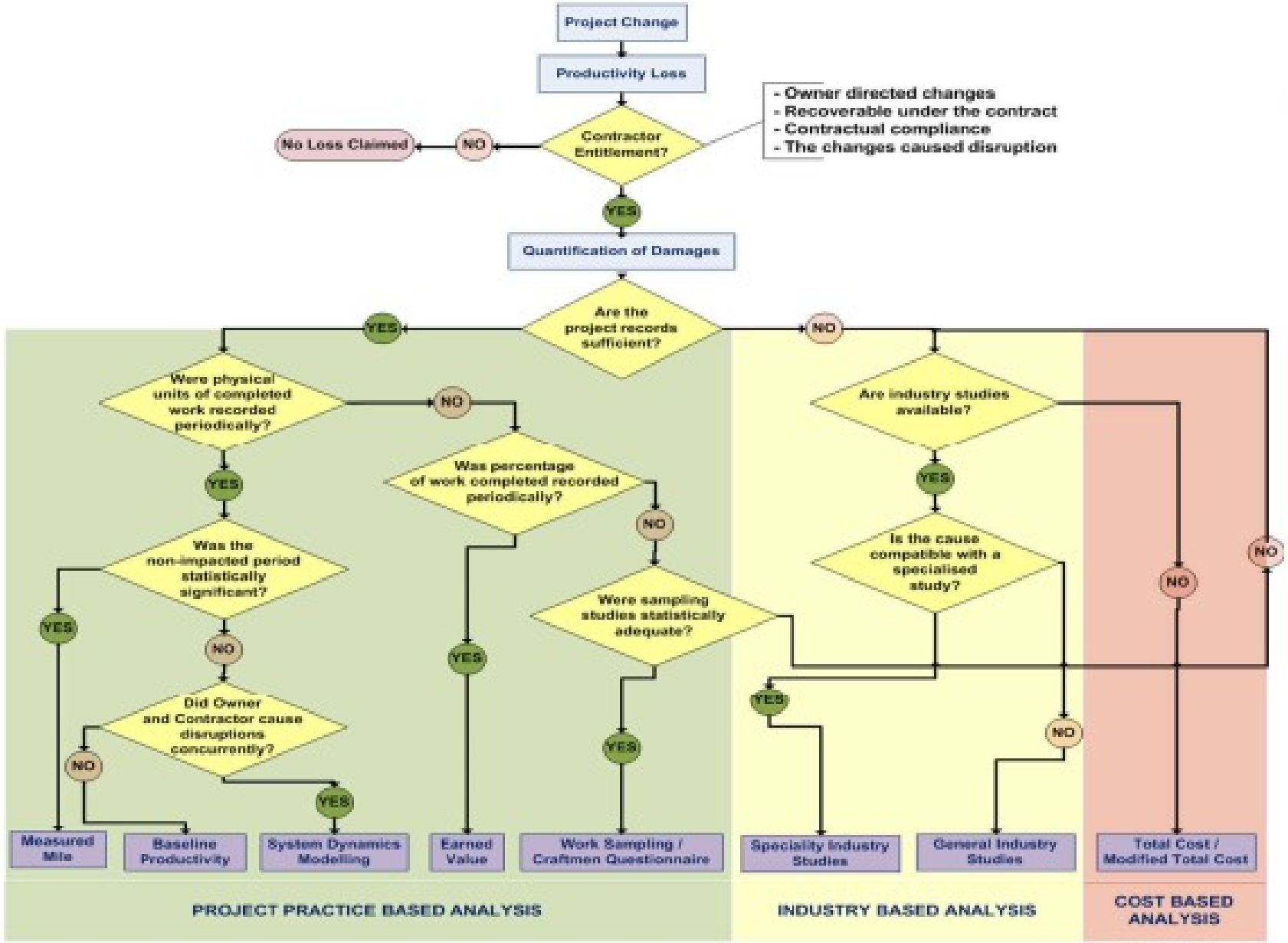
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Methods of Quantifying Lost Productivity

- The appropriate approach adopted to demonstrating disruption will be dependent upon the information available on the project in question.
- A simplified flow process to identify the appropriate approach would comprise:

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Matching the Quantifying Methods with Project Practice



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Disruption - Conclusions

- What is needed?
- **Records**
  - Need to maintain some level of productivity data for all activities
  - Need to keep more detailed records during periods of Disruption
- **Identification**
  - Need to be in a position to identify Disruption early
  - Identify the cause of the disruption and record the effect

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Disruption - Conclusions

- Under appropriate circumstances, all of the methods of disruption analysis are technically acceptable.
- Of all the methods identified, the most reliable are those based on the analysis of factual, contemporaneous information drawn from the specific project in question, i.e. Project Specific Studies.
- These methods rely upon contemporaneous documentation and knowledge from the project.
- Thus, they are the closest to approximating actual loss.