The Art of Clarity

Debunking the Myth that Delay Analysis is a Dark Art

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Yazeed is a Chartered Engineer and testifying delay expert with over 17 years of experience in the construction and engineering industries providing commercial, planning, project controls, project management, forensic delay analysis, claims management, and expert witness service to clients in the Middle East, New Zealand, Singapore, Cambodia, and Australia.

Yazeed specialises in commercial claims and forensic delay analysis and has been appointed as an expert witness in a number of adjudication and international arbitration matters.

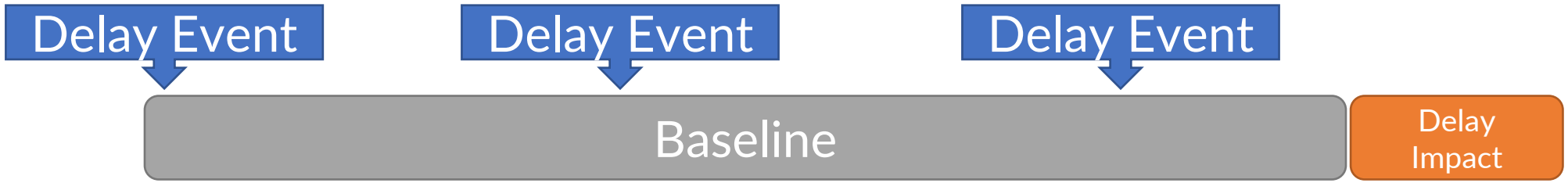
He is the current Vice President of AACE Australian Section and the Lighthouse Club Australia.

Delay Analysis

- Purpose
- Methods
- Consideration Factors
- Recommendations

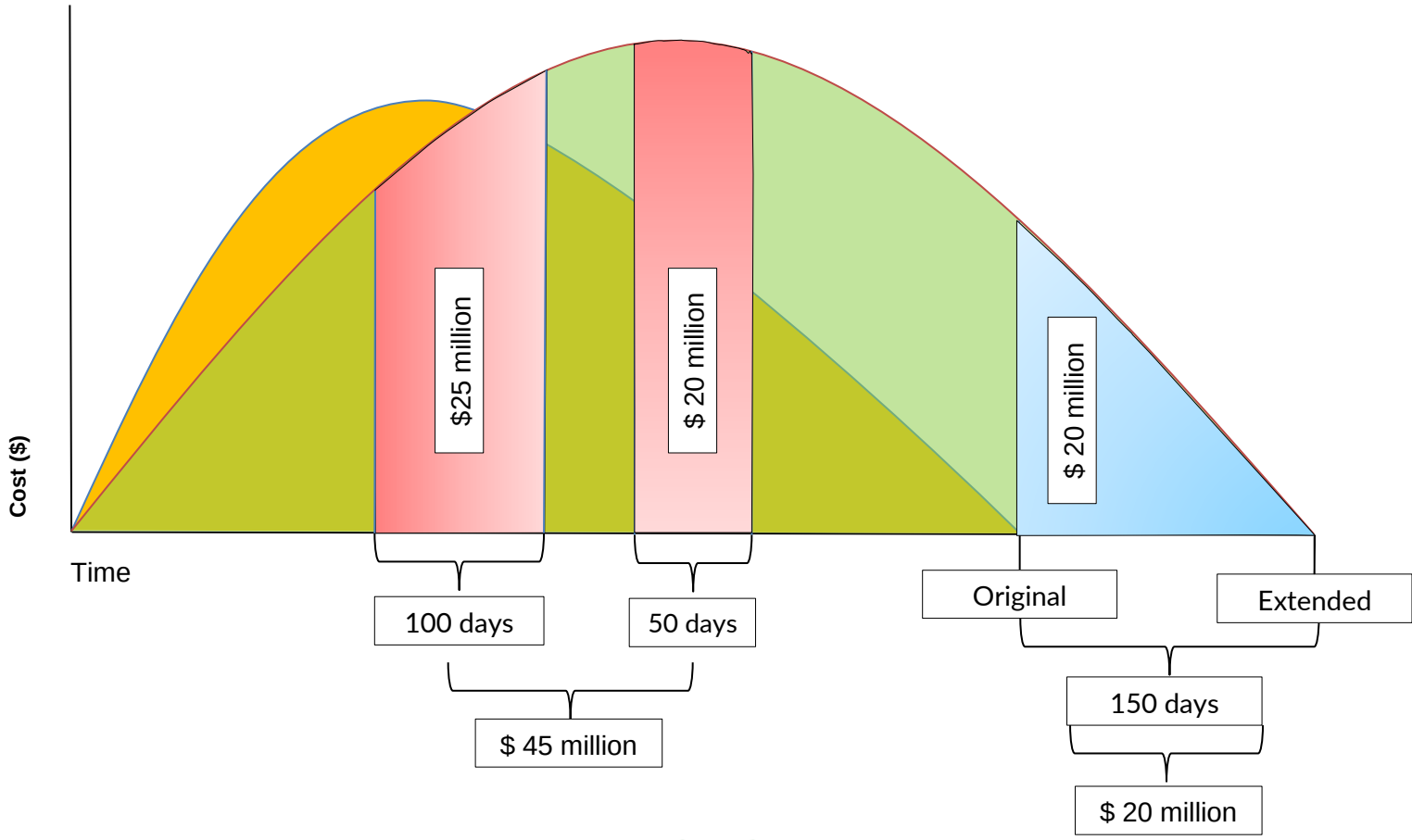
Purpose

- How much is the delay impact of each delay event?



Delay Analysis – Why?

- EoT / Prolongation Costs / LD relief
- [C-E-E-S]
  - Cause
  - Effect
  - Entitlement
  - Substantiation



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Delay Analysis Methods - SCL Protocol

Method of Analysis	Analysis Type	Critical Path Determined	Delay Impact Determined	Requires
Impacted As-Planned Analysis	Cause & Effect	Prospectively	Prospectively	• Logic linked baseline programme. • A selection of delay events to be modelled.
Time Impact Analysis	Cause & Effect	Contemporaneously	Prospectively	• Logic linked baseline programme. • Update programmes or progress information with which to update the baseline programme. • A selection of delay events to be modelled.
Time Slice Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	• Logic linked baseline programme. • Update programmes or progress information with which to update the baseline programme.
As-Planned versus As-Built Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	• Baseline programme. • As-built data.
Retrospective Longest Path Analysis	Effect & Cause	Retrospectively	Retrospectively	• Baseline Programme. • As-built programme.
Collapsed As-Built Analysis	Cause & Effect	Retrospectively	Retrospectively	• Logic linked as-built programme. • A selection of delay events to be modelled.

- Delay and Disruption Protocol (2nd Edition) (SCL Protocol)

Delay Analysis Methods - AACEI

- RP52R-06 Prospective Time Impact Analysis (TIA)
- RP29R-03 **Retrospective** Methods

Taxonomy	1	RETROSPECTIVE														
	2	OBSERVATIONAL							MODELED							
	3	Static Logic			Dynamic Logic				Additive				Subtractive			
	4	3.1 Gross	3.2 Periodic		Contemporaneous Updates (3.3 As-Is or 3.4 Split)		3.5 Modified / Reconstructed Updates		3.6 Single Base[2]		3.7 Multi Base[1]		3.8 Single Simulation		3.9 Multi Simulation[1]	
	5		Fixed Periods	Variable Windows	All Periods	Grouped Periods	Fixed Periods	Variable Windows	Global Insertion	Stepped Insertion	Fixed Periods	Variable Windows or Grouped	Global Extraction	Stepped Extraction	Fixed Periods	Stepped Extraction
Common Names		As-Planned vs As-Built	Window Analysis		Contemporaneous Period Analysis, Time Impact Analysis, Window	Contemporaneous Period Analysis, Time Impact Analysis, Window Analysis	Contemporaneous Period Analysis, Time Impact Analysis	Window Analysis, Time Impact Analysis	Impacted As Planned, What-If	Time Impact Analysis, Impacted As-Planned	Time Impact Analysis	Window Analysis, Impacted As-Planned	Collapsed As-Built	Time Impact Analysis, Collapsed As-Built	Time Impact Analysis, Collapsed As-Built	Time Impact Analysis, Window Analysis, Collapsed As-Built

Impacted as Planned (IAP)

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Impacted as Planned (IAP)

- Requirements:
  - Logic linked **baseline** program.
  - **Delay events** to be modelled.

- Advantages:
  - **Simple** and easy
  - Quick

- Disadvantages :
  - Does not consider **actual progress**
  - Does not deal with **change in sequence**
  - Requires a **good baseline program** (realistic)
  - Hypothetical/ Produces an **estimate of the delay**

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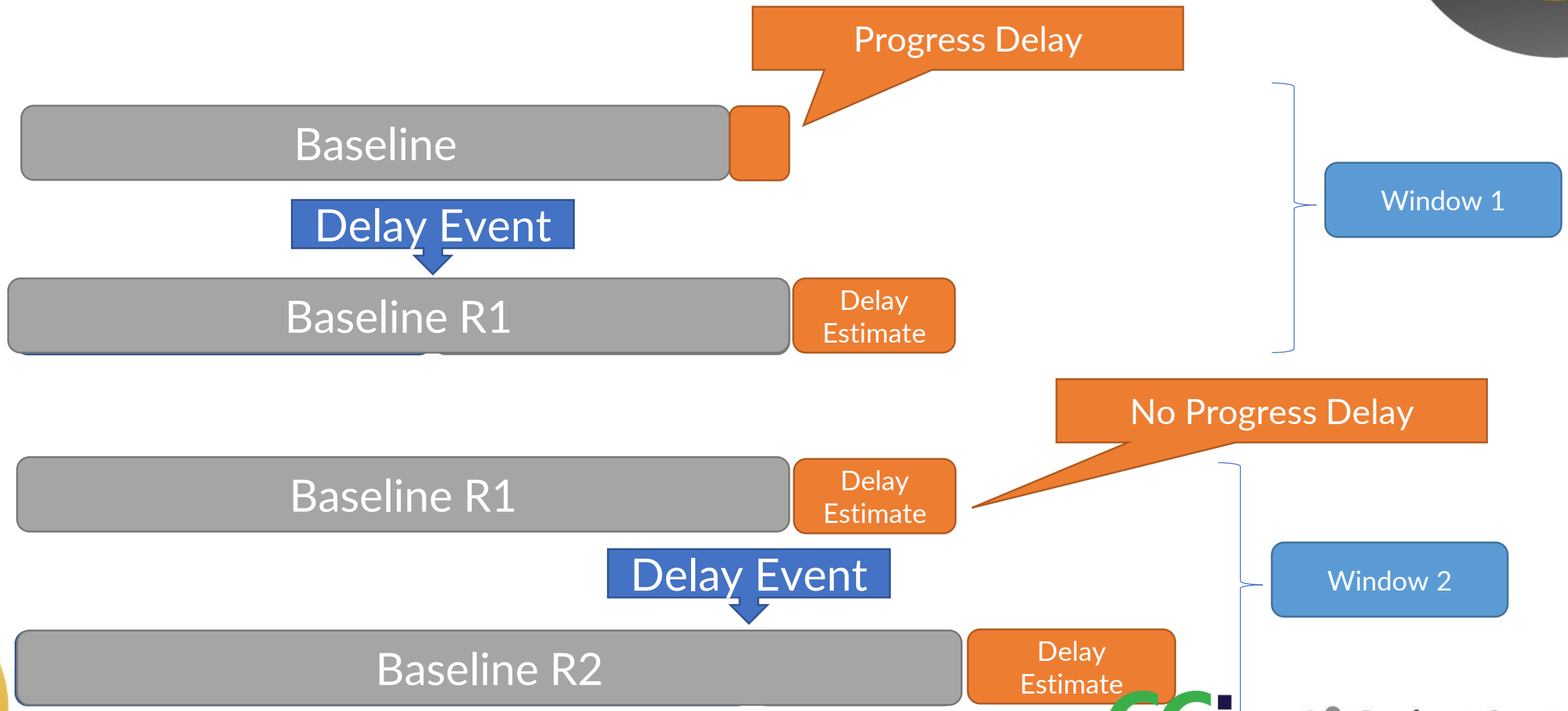
Time Impact Analysis (TIA)



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Time Impact Analysis (TIA)

- Requirements:
  - Logic linked **baseline program.**
  - **Updated programs** or progress information with which to update the baseline program.
  - A selection of delay events to be modelled.

- Advantages:
  - Provide an estimate of the delay **contemporaneously**
  - **Complies with most standard contract requirements**

- Disadvantages :
  - Can be **time consuming** depending on available programs, number of events and windows
  - May not be adequate retrospectively
  - **Hypothetical**

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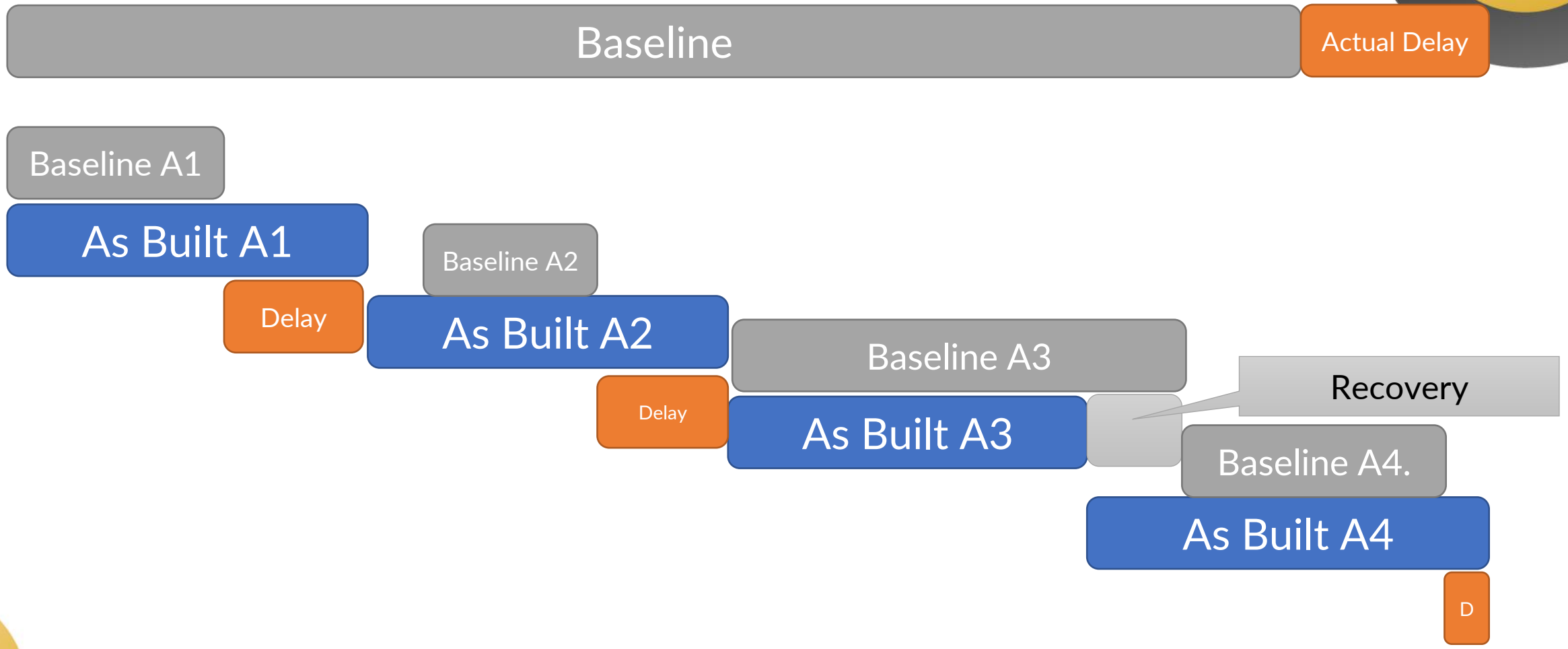
Retrospective Longest Path



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Retrospective Longest Path

- Requirements:
  - **Baseline** program
  - **As-built** program

- Advantages:
  - Does not require modelling of the delay
  - Produces **retrospective as-built critical path** (actual)

- Disadvantages :
  - Requires **logic linked as-built program**
  - Static; limited capacity to recognize **switches in the critical path**

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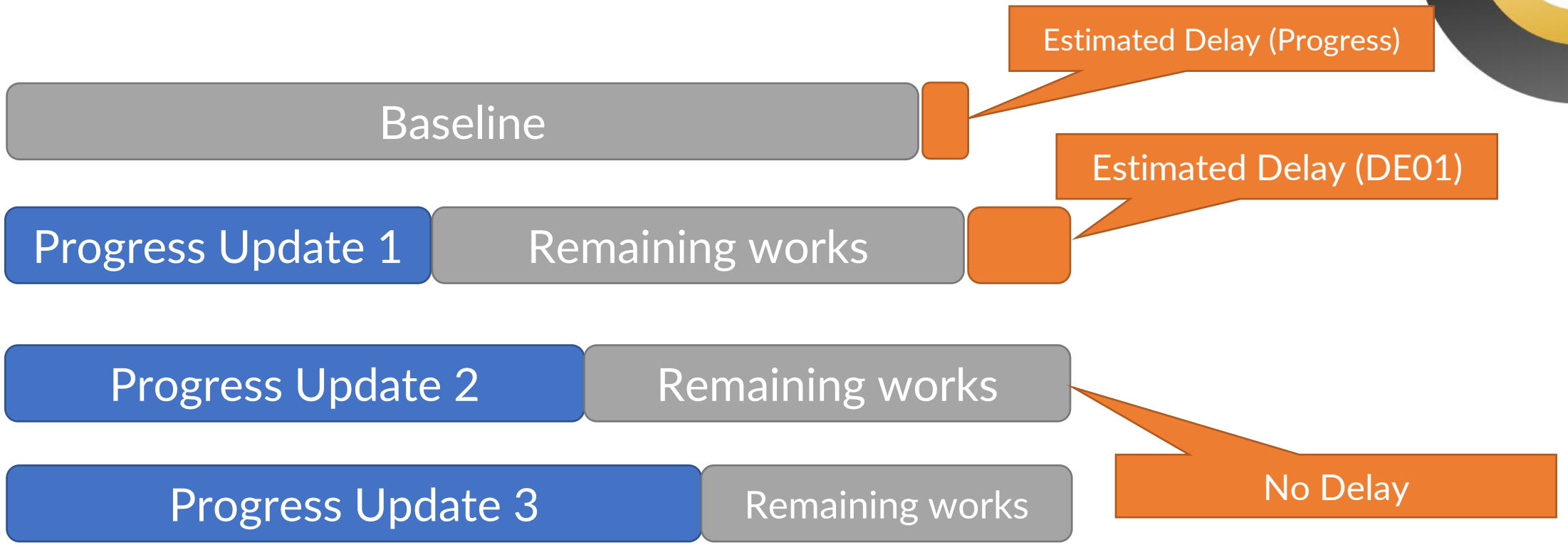
Time Slice Windows Analysis



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Time Slice Windows Analysis

- Requirements:
  - Logic linked **baseline program.**
  - **Updated programs** or progress information with which to update the baseline program.
  - Performed in windows.

- Advantages:
- Identifies the **switches in the critical path**
- Relies on **contemporaneous** programs and information

- Disadvantages :
  - Does not deal with **change in sequence**
  - Requires **good programs** (realistic)

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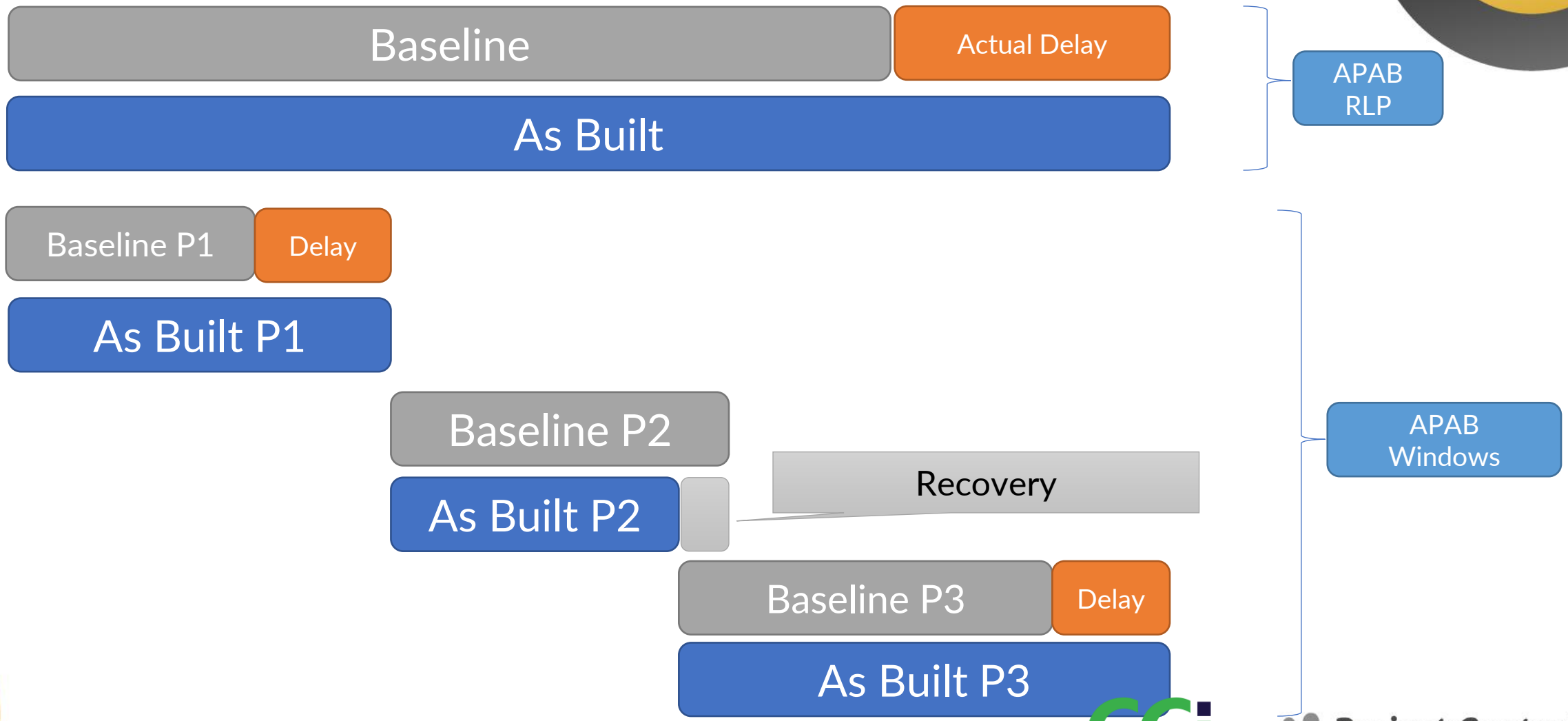
As-Planned versus As-Built Windows Analysis



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As-Planned versus As-Built Windows Analysis

- Requirements:
  - **Baseline program**
  - **As-built data.**

- Advantages:
- Identifies the **switches in the critical path**
- **Less reliant on programming software**
- Identifies **contemporaneous** critical Path

- Disadvantages :
  - **Subjective and based on common sense**
  - Requires **extensive analysis and reasoning**

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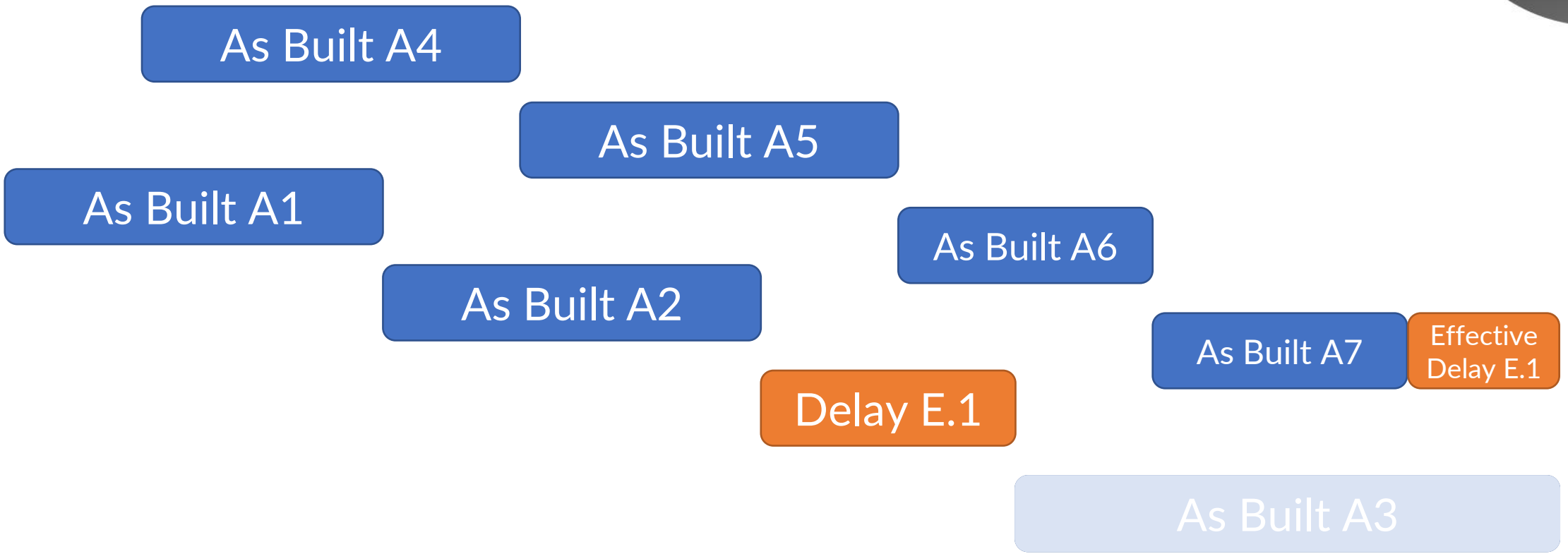
Collapsed As- Built Analysis (but-for)



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Collapsed As- Built Analysis (but-for)

- Requirements:
  - **Logic linked as-built program**
  - **Delay events** to be modelled.

- Advantages:
  - **Does not require a baseline program**
  - Provides the **delay impact but for the delay event**
  - Can be done in windows

- Disadvantages :
  - Requires **logic linked as-built program**, including delay events, which can be **time consuming**
  - Specific to the event/ **Does not analyse other delays/ critical paths**
  - **Hypothetical “but for”**

Factors to Consider

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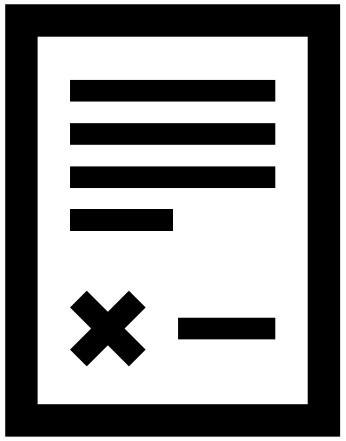
Contractual Requirements



*34.2 … **will probably cause delay….***

*34.3 … **has been delayed …***

- Definitions
- Time for completion / milestones
- Types of events / accepted risks under the Contract!
- Prospective / retrospective
- Notice requirements

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Time of Performing the Analysis

Before the Delay (Prospective / Cause and Effect Analysis)

Is there a **likely** delay?

(e.g. Design information will be issued 10 days late)

What's the **likely** impact?

(e.g. Completion will be delayed by 15 days)

Who's responsible?

(e.g. Owner is responsible for the design)

After the Delay (Retrospective Analysis / Effect and Cause Analysis)

Was there an **actual** delay?

(e.g. Design information was issued 10 days late)

What's the **actual** impact?

(e.g. Completion was delayed by 15 days)

Who's responsible?

(e.g. Owner is responsible for the design)

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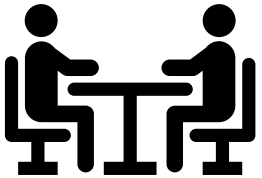
Purpose of Analysis

- Extension of time claim?
- Prolongation costs?
- Relief from LDs?
- Recovery periods? Costs?
- Site submission / formal dispute
  - Negotiation, medication, arbitration, adjudication, litigation and arbitration.
- The attitude of the opponent party



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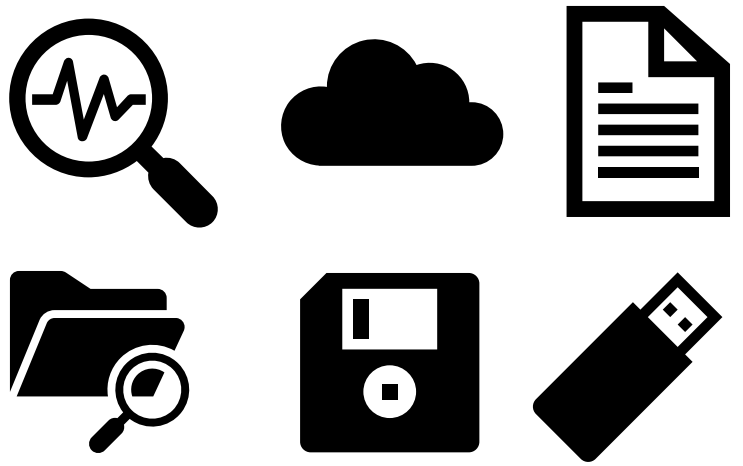
Source Data Availability and Reliability

- Records?
- Baseline program
- Quality of available programs
- As built data



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Complexity of the Dispute Budget and Time Allowed

- Requires special technical knowledge
- Requires complex (or simple) analysis

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Expertise of the Delay Analyst

- Expertise and skills
- Reputation (Individual and organisation)
- Software required

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Project History

- Was there any previous analysis carried out?
- Does the other party have an objection to a certain method?
- Other project history?

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Delay Events

- Nature, type, length, timings, and number of the delay events

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Capabilities of Methods

- Capabilities, shortcomings and strength points of the method

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Other matters

CHANGED SEQUENCE OF WORK

CONCURRENT DELAY / PACING

CRITICAL PATH DEFINITION

OWNERSHIP OF THE FLOAT

MITIGATION AND ACCELERATION

DISRUPTION (DELAY EFFECT)

SOFTWARE USED / SCHEDULING SETTINGS

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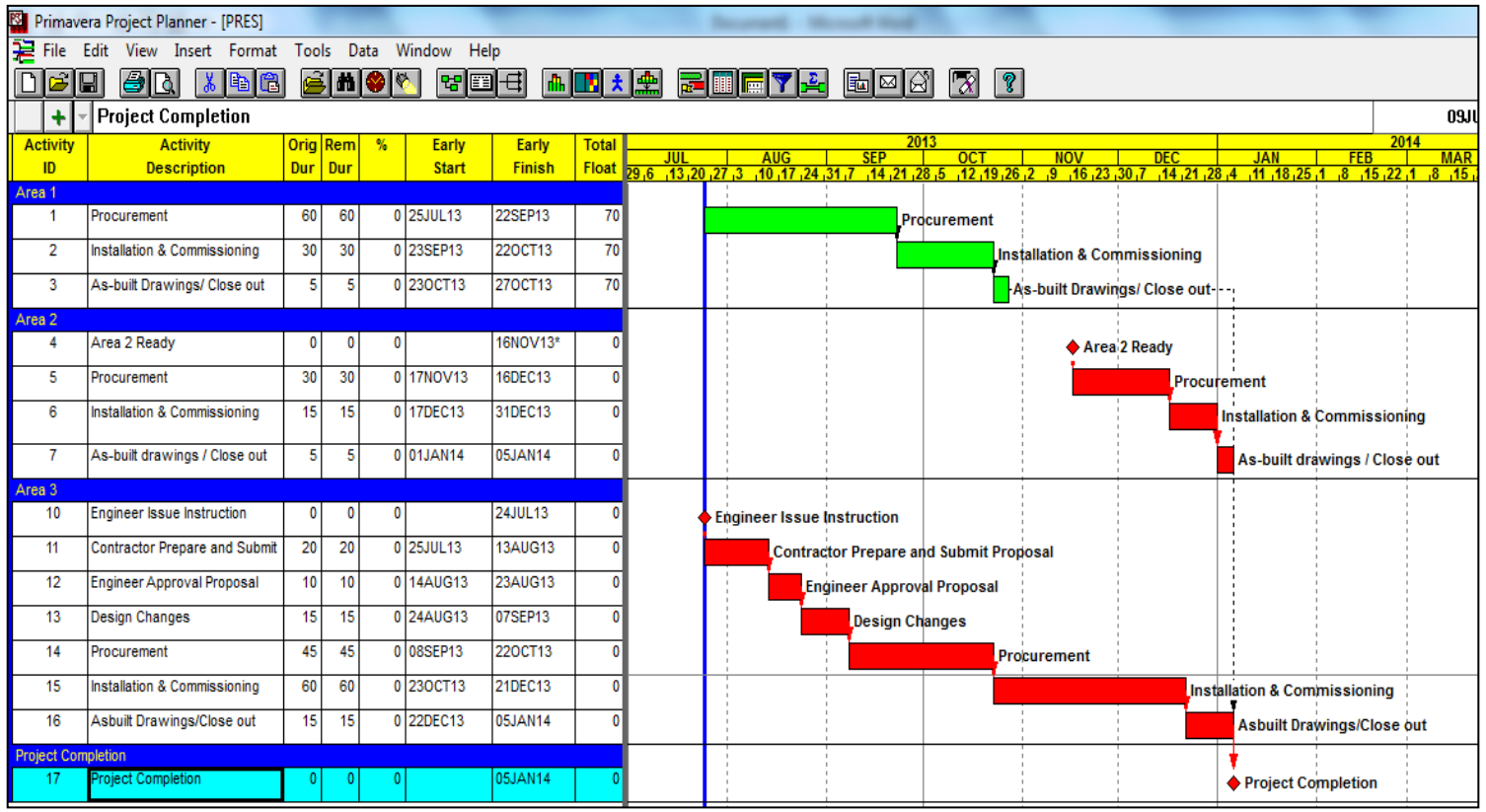
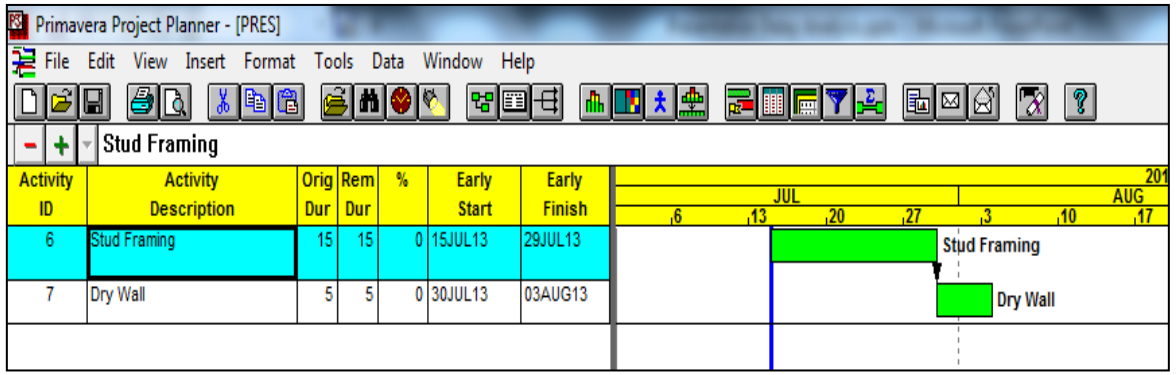
Critical Path & Longest Path

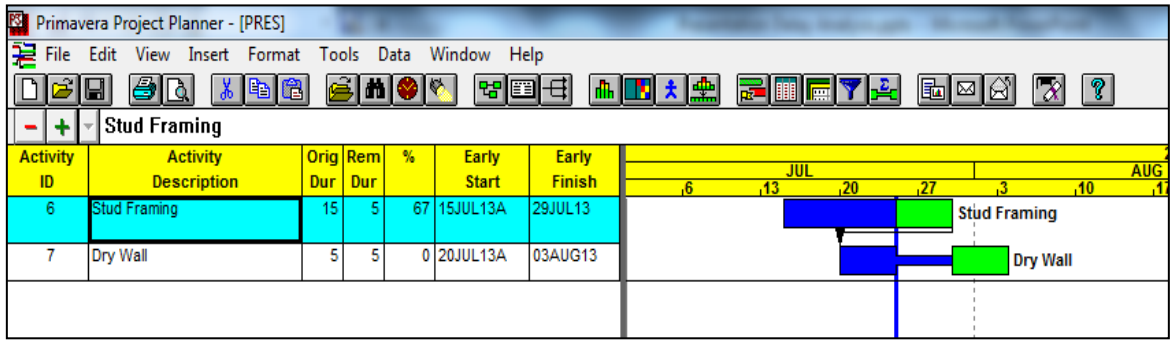
There are 2 critical paths represented in the following screenshot which pass through Area 2 & Area 3. The longest path passes through Area 3 only.

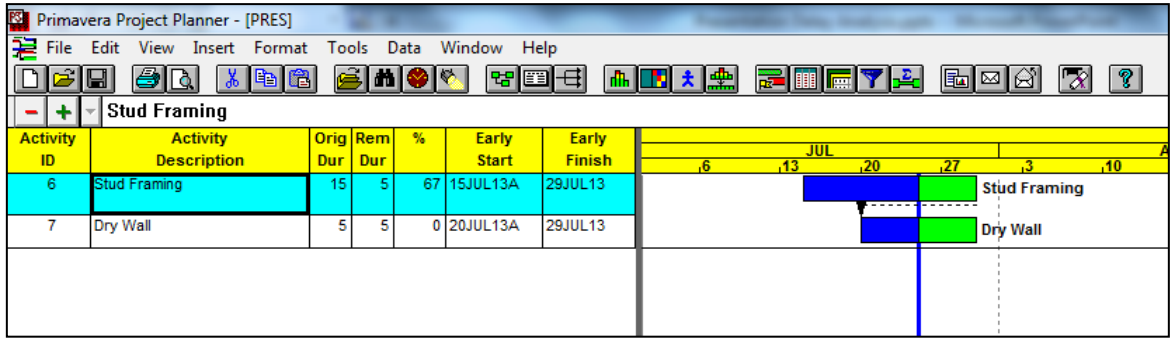


Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish	Total Float
Area 1							
1	Procurement	60	60	0	25JUL13	22SEP13	70
2	Installation & Commissioning	30	30	0	23SEP13	22OCT13	70
3	As-built Drawings/ Close out	5	5	0	23OCT13	27OCT13	70
Area 2							
4	Area 2 Ready	0	0	0		16NOV13*	0
5	Procurement	30	30	0	17NOV13	16DEC13	0
6	Installation & Commissioning	15	15	0	17DEC13	31DEC13	0
7	As-built drawings / Close out	5	5	0	01JAN14	05JAN14	0
Area 3							
10	Engineer Issue Instruction	0	0	0		24JUL13	0
11	Contractor Prepare and Submit	20	20	0	25JUL13	13AUG13	0
12	Engineer Approval Proposal	10	10	0	14AUG13	23AUG13	0
13	Design Changes	15	15	0	24AUG13	07SEP13	0
14	Procurement	45	45	0	08SEP13	22OCT13	0
15	Installation & Commissioning	60	60	0	23OCT13	21DEC13	0
16	Asbuilt Drawings/Close out	15	15	0	22DEC13	05JAN14	0
Project Completion							
17	Project Completion	0	0	0		05JAN14	0

Retained Logic and Progress Override







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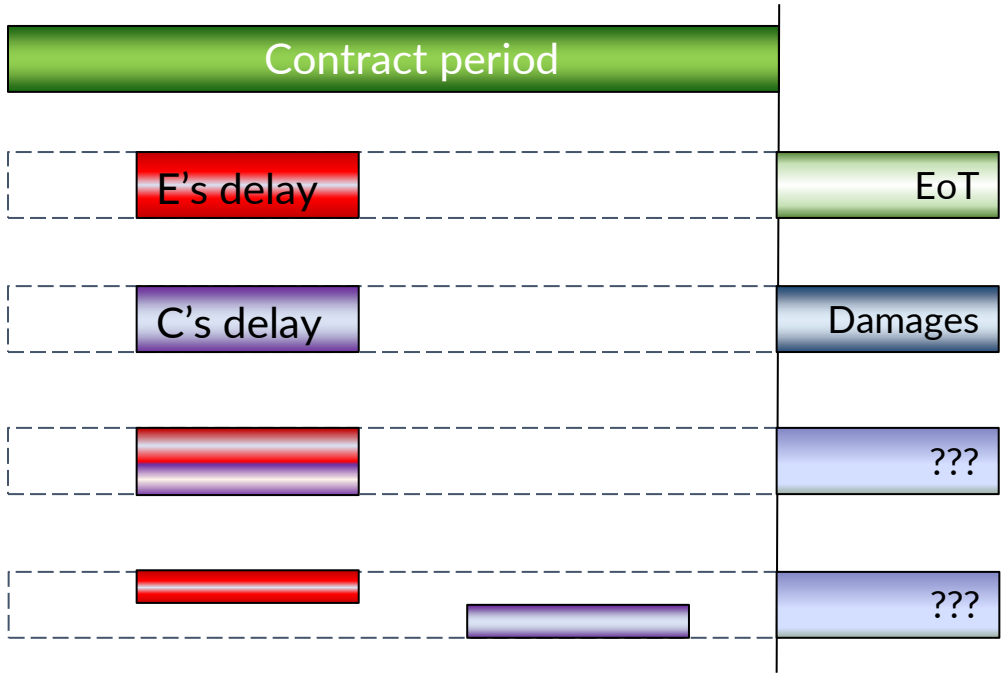
Concurrent delay

- Concurrent/ Parallel delay refers to a situation where two (or more) causes of delay are impacting the project in parallel with one another (parallel events and/ or parallel impacts).



True concurrency

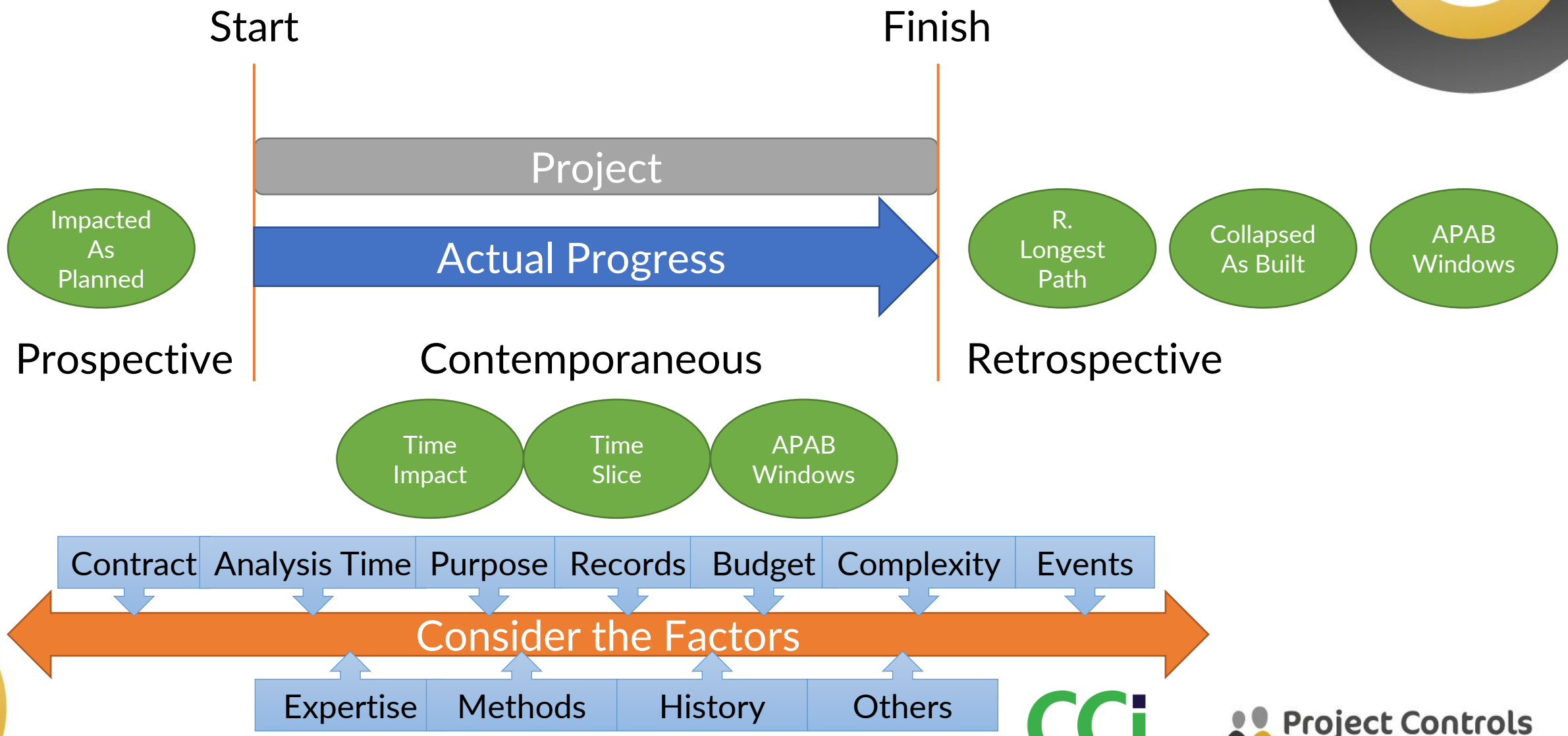
Concurrent 'in effect' but not truly concurrent

The Most Appropriate Method?

- **There is no single "correct" method of delay analysis.** Instead, the court will consider the suitability of a particular method in the context of the specific case (Alstom Ltd v Yokogawa Pty Ltd [No 7])
- **Fact wins over untested assumptions and computerized methods** (Skanska Construction UK Ltd v Egger (Barony) Ltd (2004))
- Demonstrate delays on the balance of probabilities (Walter Lilley v Mackay (2012) EWHC 1773 (TCC))
- **Windows" are not methods of analysis** (Mirant Asia-Pacific Construction (Hong Kong) Ltd v Ove Arup and Partners International Limited [2007] EWHC 918 (TCC))
- The Court of Appeal considered that it was **open to an expert to assess delay on a prospective or retrospective basis** (Built Qld Pty Limited v Pro-Invest Australian Hospitality Opportunity (ST) Pty Ltd (2022))
- There is an **overriding objective of ensuring that the conclusions derived from that analysis are sound from a common sense perspective** (Thomas Barnes & Sons PLC v Blackburn With Darwen Borough Council (2022))
- Rejected both parties' expert delay analysis and the methodologies The judge noted the complexity of the expert reports, describing them as "**Impenetrable**" (White Constructions Pty Ltd v PBS Holdings Pty Ltd [2019] NSWSC 1166)

Dark Art!

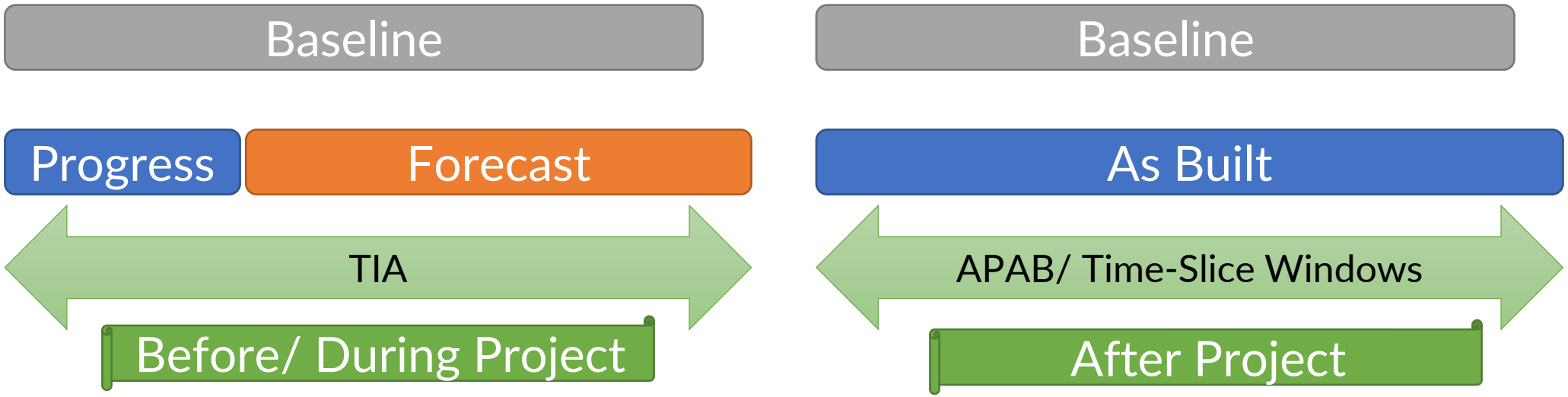
Consideration Factors



Recommendations

Generally, subject to consideration of the factors:

- Time Impact Analysis (TIA) (Prospective-Forward-calculations)
- As Planned Vs As Built Windows Analysis (APAB/ Time-slice Window) (Retrospective-Backward-calculations)



Key Note

- Delay Analysis is a not a programming/ planning exercise
- Fact wins over assumptions, and hypothetical/ speculative impacts
- Narratives and reasoning are essential
- The simpler and shorter, the better

Thank You

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