Project Controls Expo – 18 November 2014
Emirates Stadium, London

Progress | Position | Prediction

The key to completing projects on time

About the Speaker

❑ David Bordoli

David has over 30 years in the construction industry specialising in planning and scheduling, initially with contractors and latterly as a consultant focusing on forensic delay analysis. David is academically and professionally qualified and is the author of numerous high quality papers. He was awarded an MSc degree with distinction for his work on '*The simulation of construction project delays using network techniques*', the method of analysis now known as 'Time Impact Analysis'. His book, '*A Handbook for Construction Planning and Scheduling*', co-authored with Andrew Baldwin, was published by Wiley Blackwell in May 2014. Most recently he has been engaged as an expert on major projects in South Africa and China.
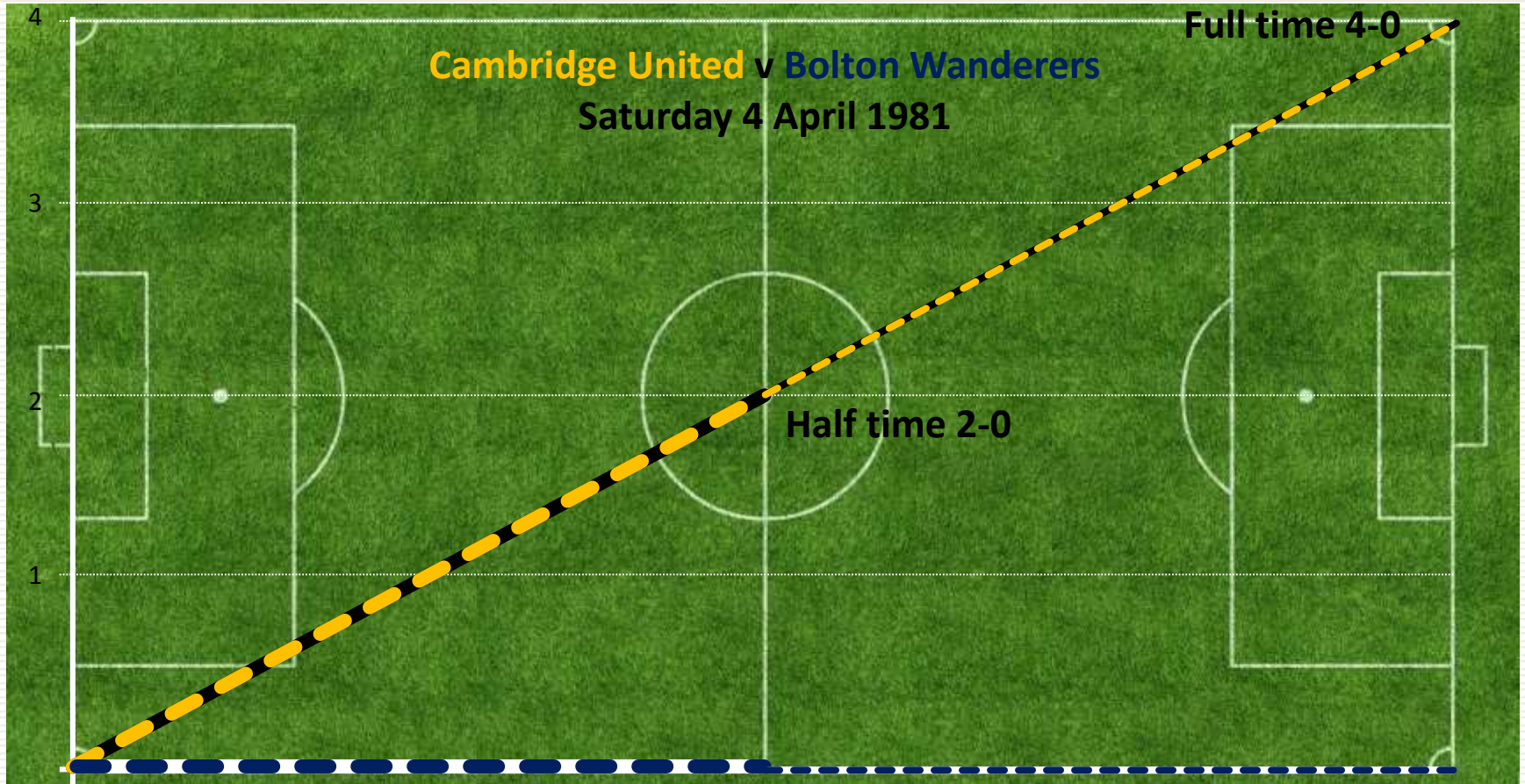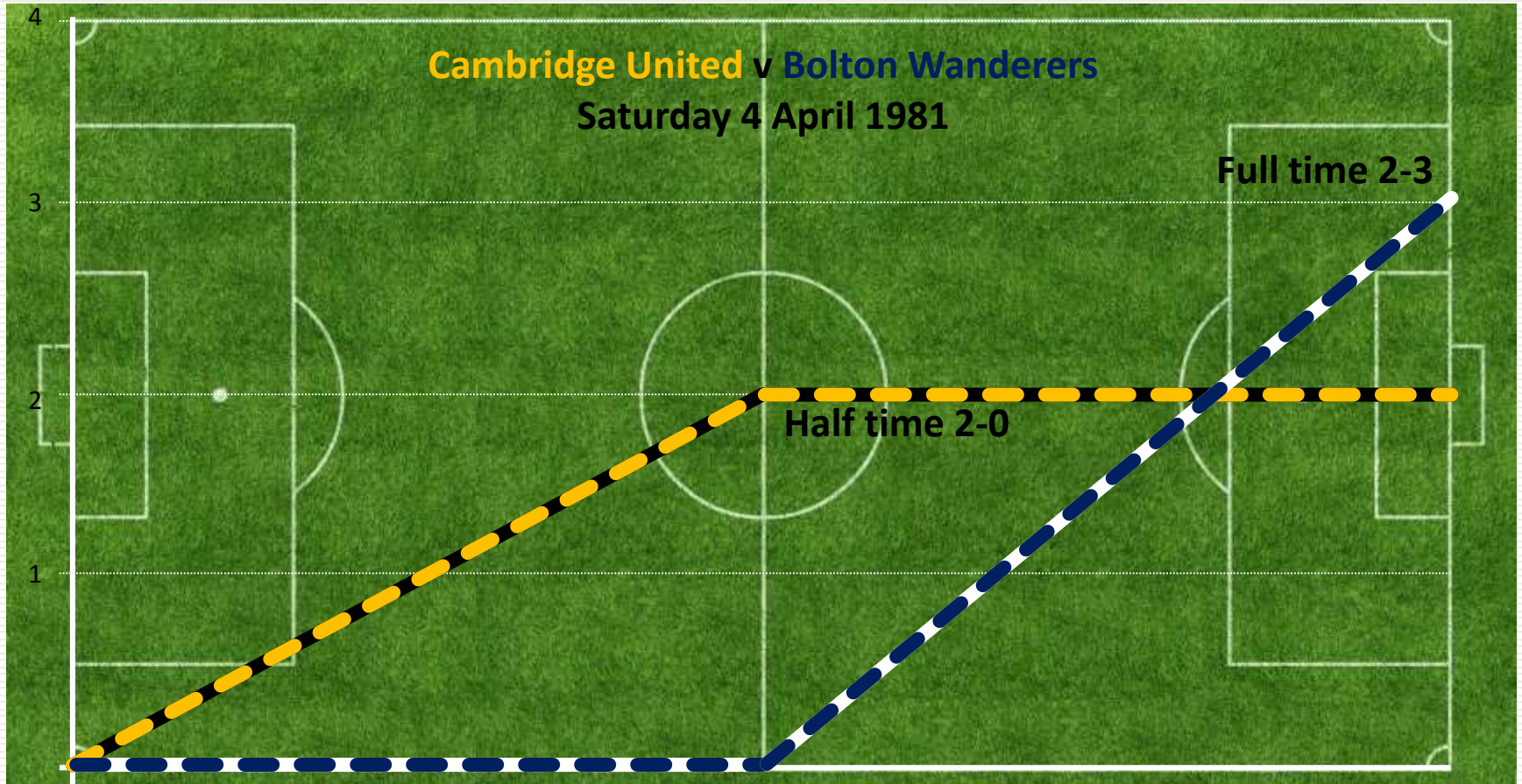
Cambridge

3

Cambridge

Cambridge – First Half

Cambridge United v Bolton Wanderers
Saturday 4 April 1981

Full time 4-0

Half time 2-0

4
3
2
1

Cambridge – Second Half

Cambridge United v Bolton Wanderers
Saturday 4 April 1981

Full time 2-3

Half time 2-0

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Cambridge – Full Time

Cambridge United v Bolton Wanderers
Saturday 4 April 1981

Full time 2-3

Half time 2-0
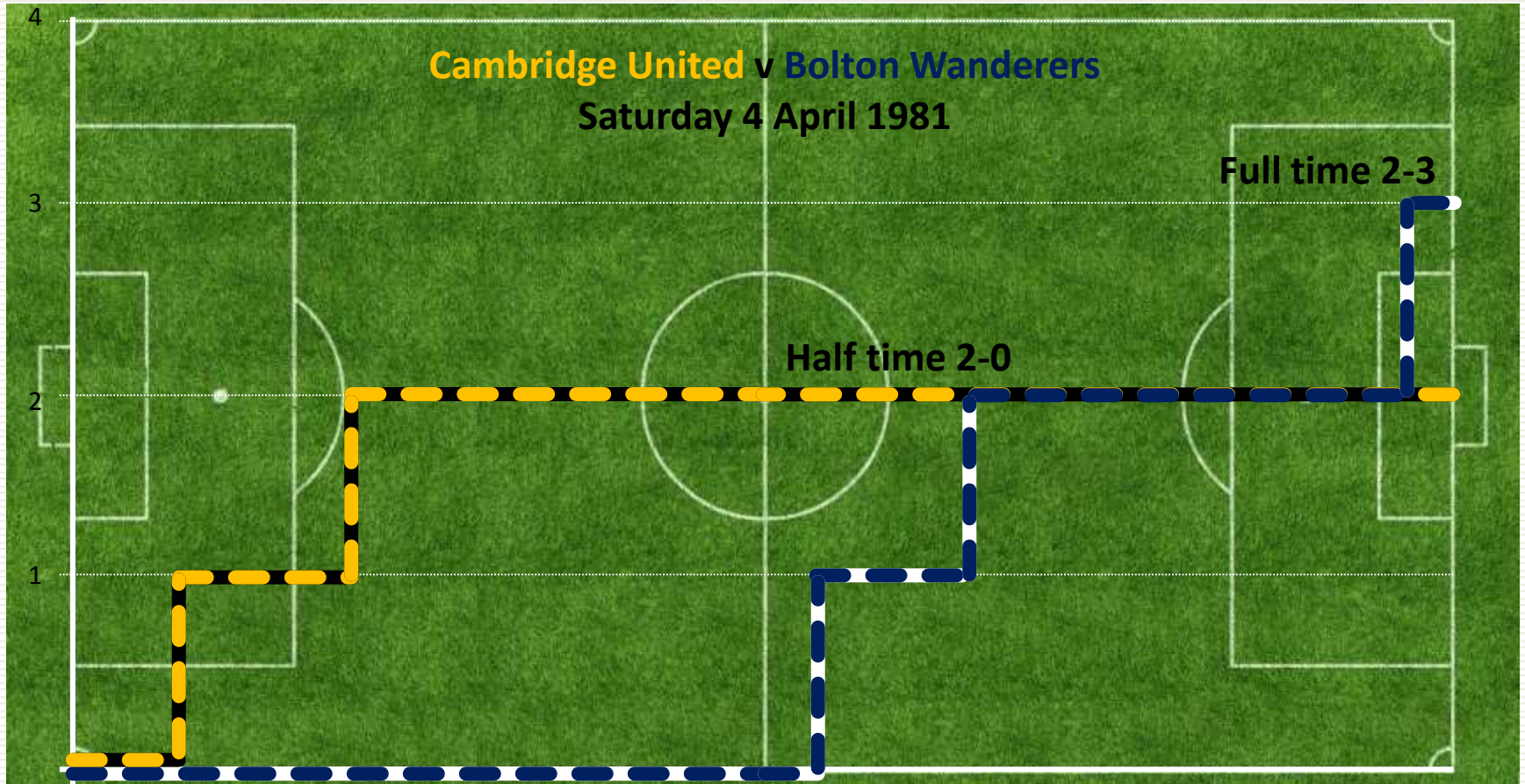
Change

Changing room p Change control meeting

Strategy	Change methods
Motivation	Bonus payments
Substitution	Subcontractors
Tactics	Reprogramme
Captain	Project Manager
'Professional' fouls	Claimsmanship
Referee	RE/ PM/CA

Predictability Time - Construction
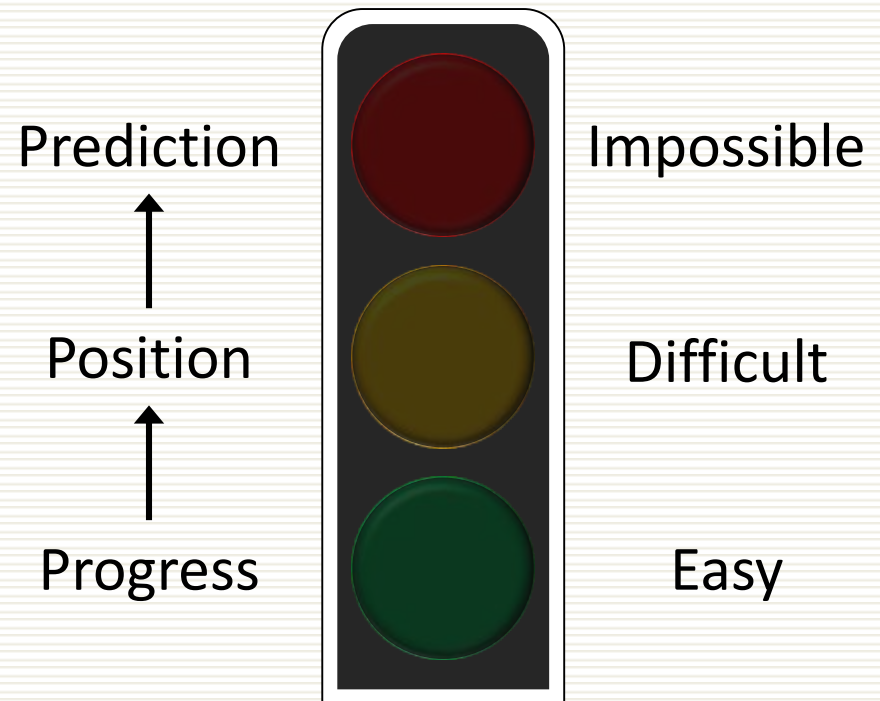
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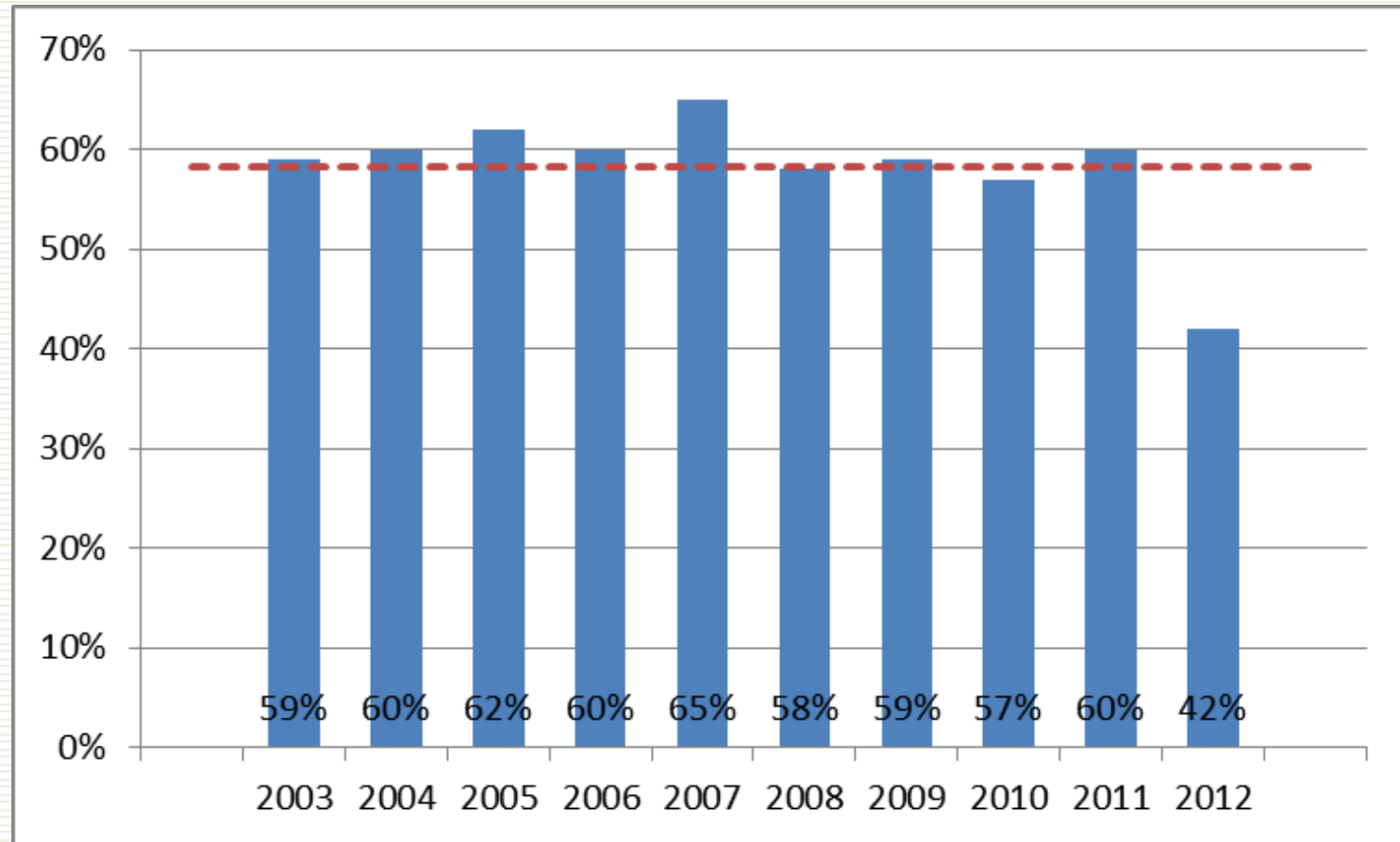
Progress | Position | Prediction

❑ **Active management of time comprises three steps**

　　▪ Measure Progress
　　▪ Determine Position
　　▪ Completion Prediction

Prediction is very difficult, especially if it's about the future

Prediction　　→　　Impossible

Position　　↑

Progress　　↑　　Difficult

Easy

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Progress – how much has been done

❑ **Progress**

  ◼ Physically complete (%)

    ◼ Time expended

    ◼ Time remaining

    ◼ Time to complete

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Position – what is the current status

❑ Activity Position

■ *time* ahead

■ on schedule

■ *time* behind

if $S \leq TN \leq F$, then if (% < 100, P = S + (D x %) – TN, else P = 0), else
if $S \leq TN \geq F$, then P = S + (D x %) – TN, else
if $S \geq TN$, then if (% > 0, P = S + (D x %) – TN, else P = 0)

Where: P is the activity position,
         S is the planned start of the activity,
         F is the planned finish of the activity,
         TN is time now,
         D is the planned duration of the activity, and
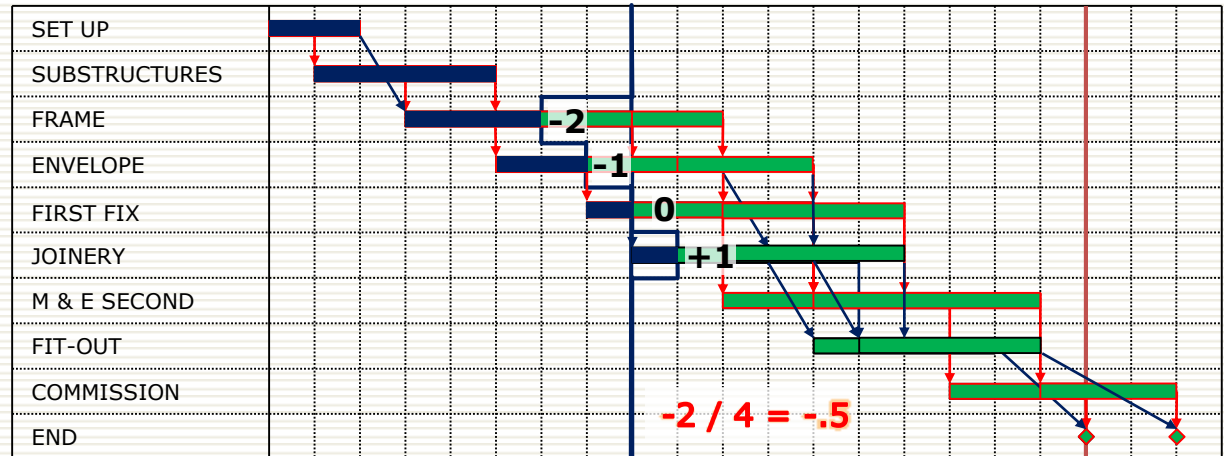   % is the percentage complete of the activity at time now.
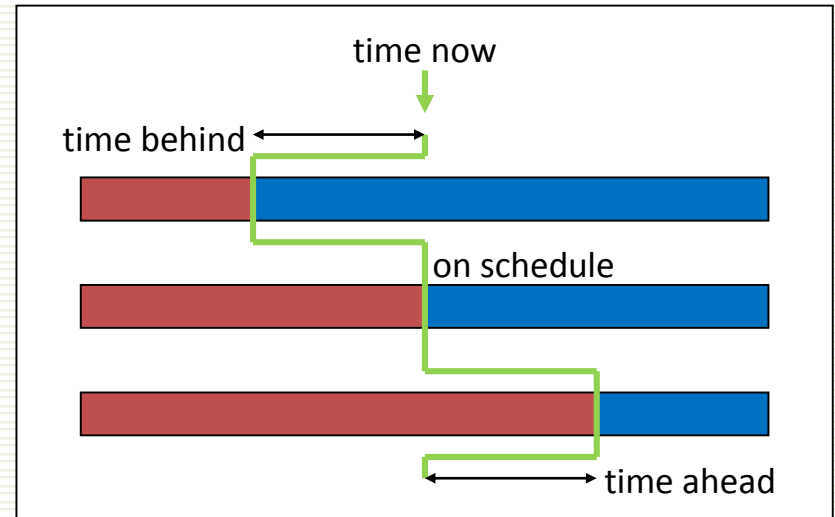
Position – what is the current status

❑ Project Position

■ Averaging

■ Critical Path Methods

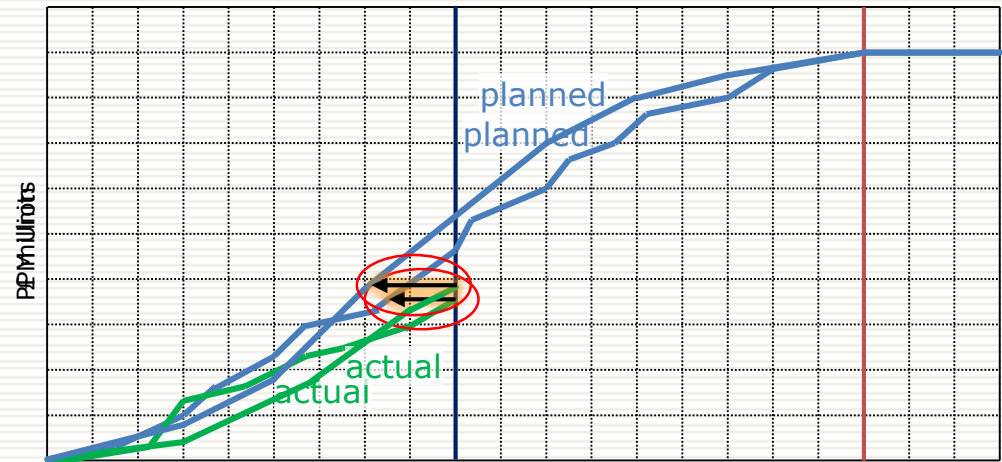|		
SET UP		
SUBSTRUCTURES		
FRAME	**-2**	
ENVELOPE	**-1**	
FIRST FIX	**0**	
JOINERY	**+1**	
M & E SECOND		
FIT-OUT		
COMMISSION		
END	**-2 / 4 = -.5**	

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E X P O

Position – what is the current status

❑ Project Position

■ Averaging

■ Critical Path Methods
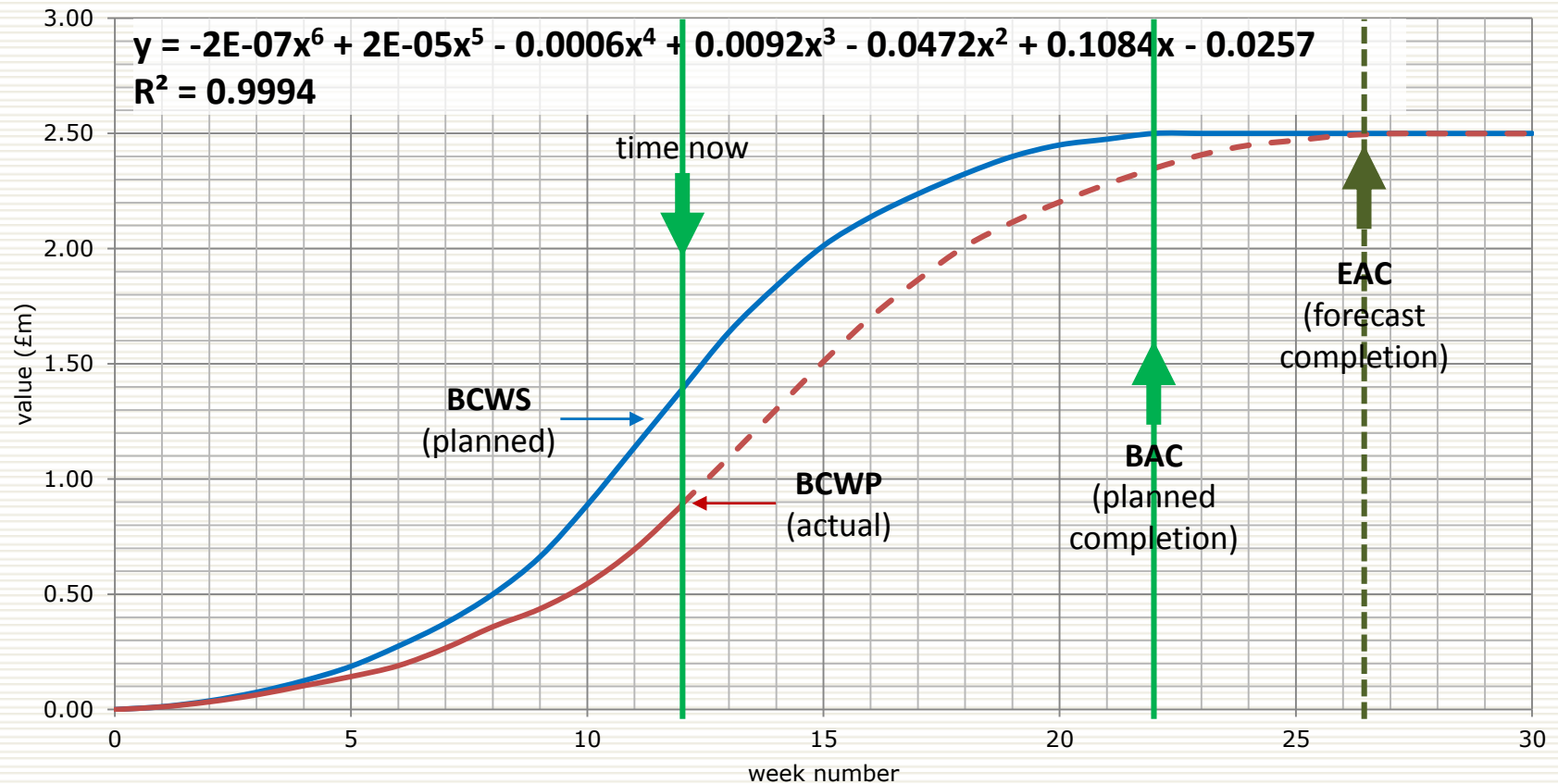
■ Planned Progress Monitoring

■ Earned Value Analysis

Prediction – when will the project end

❑ **Predicting** is the estimation or forecasting of some future event or condition of the project as a result of the study and analysis of available data on the basis of observation, experience or scientific reason.
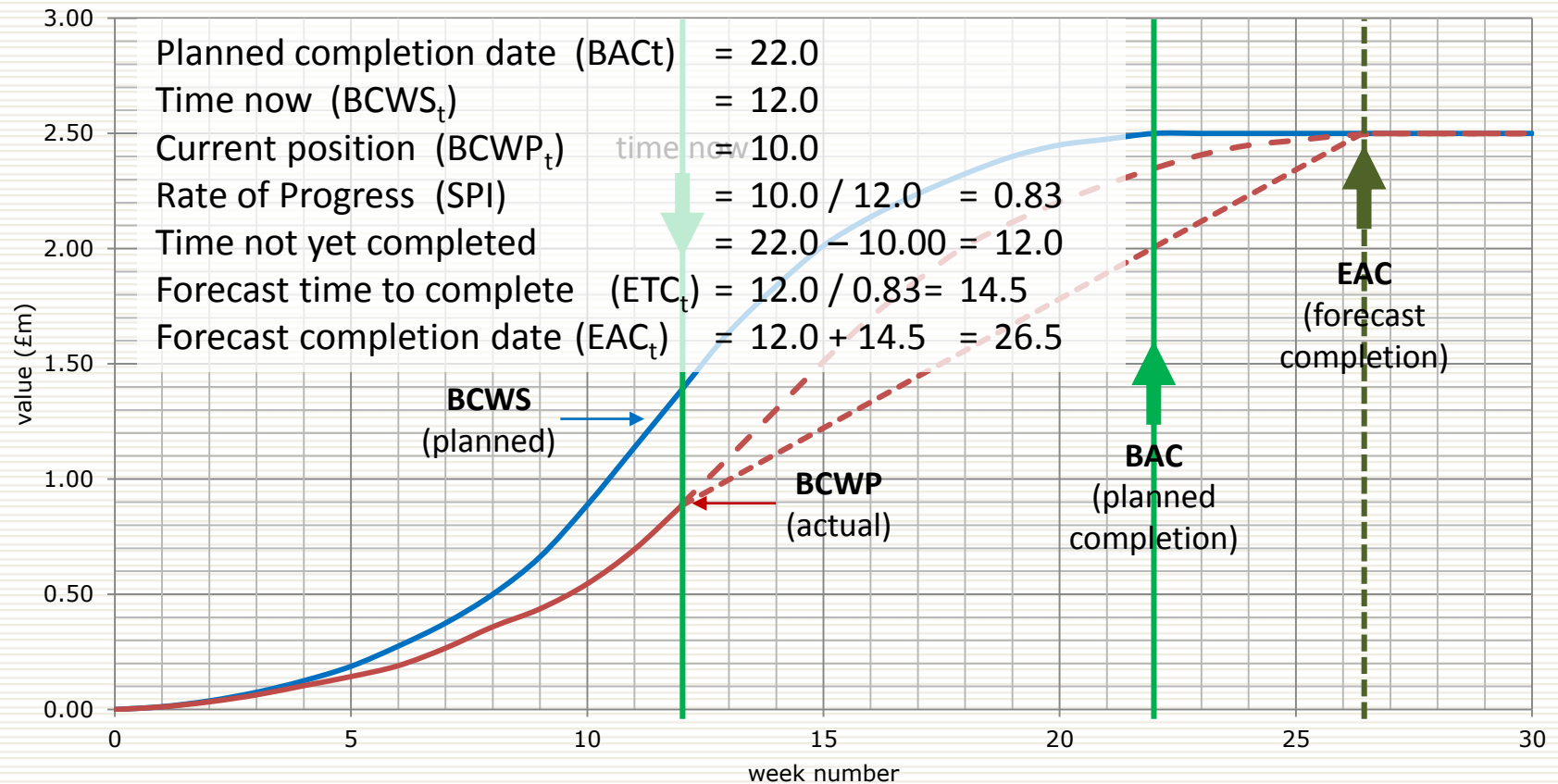
- Experience
- ~~Critical Path Analysis~~
- Extrapolation
- Reprogramming
  - Parkinson's Law
  - Student Syndrome
- Earned Value Analysis

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Forecasting Using Earned Value Analysis
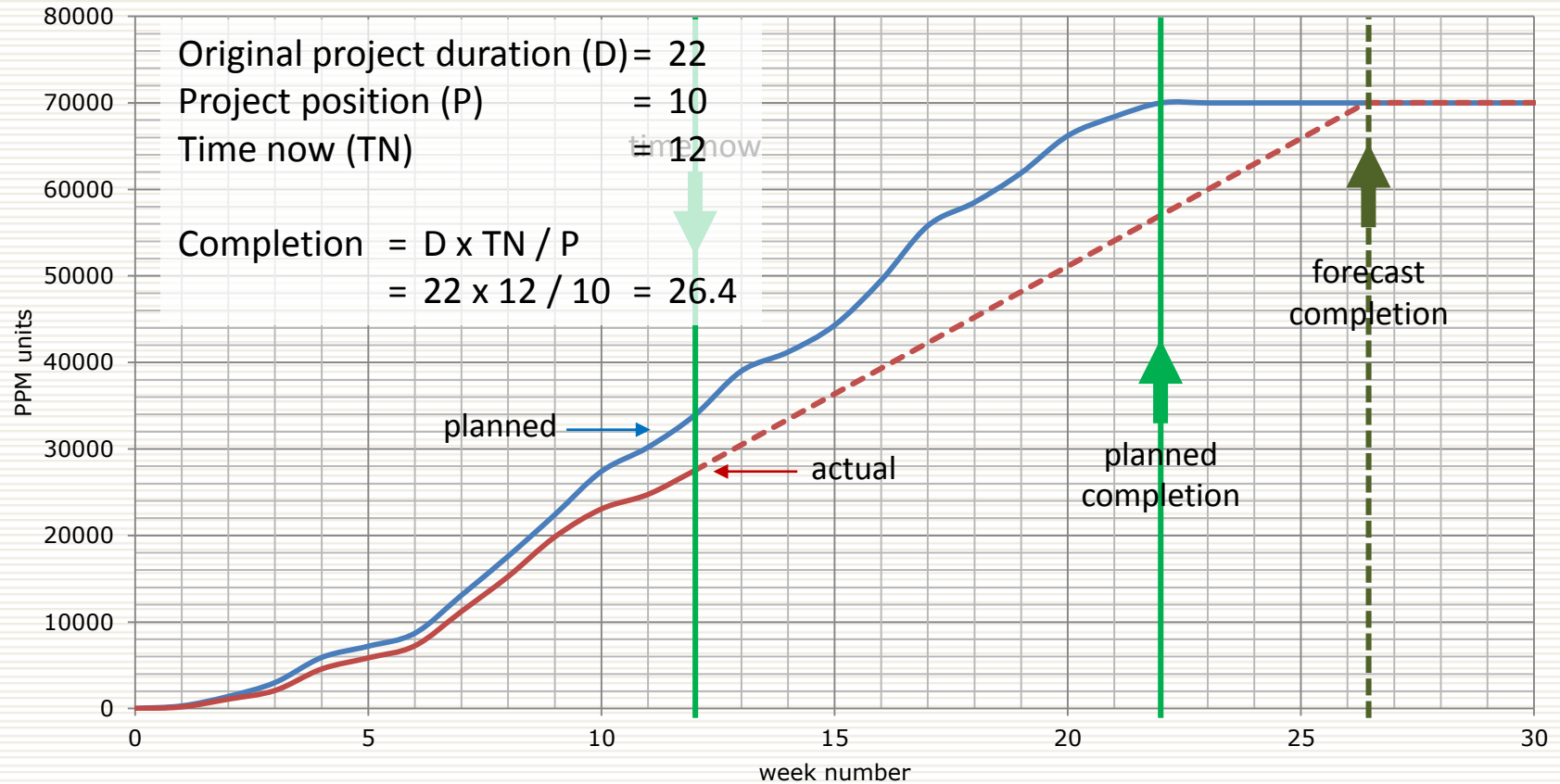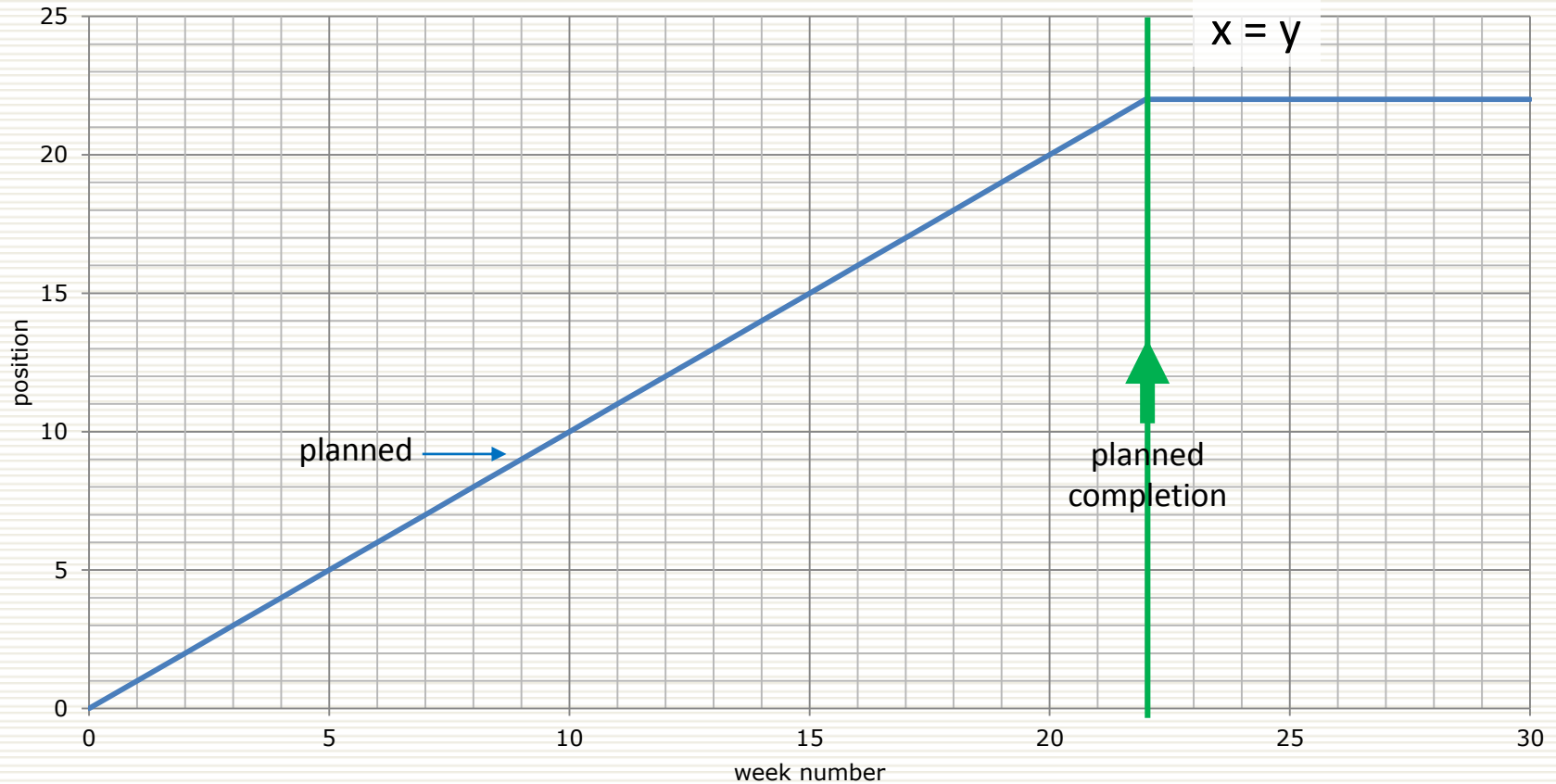

$$y = -2E\text{-}07x^6 + 2E\text{-}05x^5 - 0.0006x^4 + 0.0092x^3 - 0.0472x^2 + 0.1084x - 0.0257$$
$$R^2 = 0.9994$$

time now

EAC
(forecast
completion)

BCWS
(planned)

BCWP
(actual)

BAC
(planned
completion)

value (£m)

week number

Forecasting Using Earned Value Analysis

Planned completion date (BACt)   = 22.0
Time now (BCWS$_t$)   = 12.0
Current position (BCWP$_t$)   = 10.0
Rate of Progress (SPI)   = 10.0 / 12.0   = 0.83
Time not yet completed   = 22.0 – 10.00 = 12.0
Forecast time to complete   (ETC$_t$) = 12.0 / 0.83 = 14.5
Forecast completion date (EAC$_t$)   = 12.0 + 14.5 = 26.5

time now

BCWS (planned)

BCWP (actual)

BAC (planned completion)

EAC (forecast completion)

value (£m)

week number

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Forecasting Using Planned Progress Monitoring

Original project duration (D) = 22
Project position (P) = 10
Time now (TN) = 12

Completion = D x TN / P
= 22 x 12 / 10 = 26.4

time now

planned

actual

planned completion

forecast completion

PPM units

week number

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A Simple Approach to Forecasting
The Planned Model

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The Actual Model

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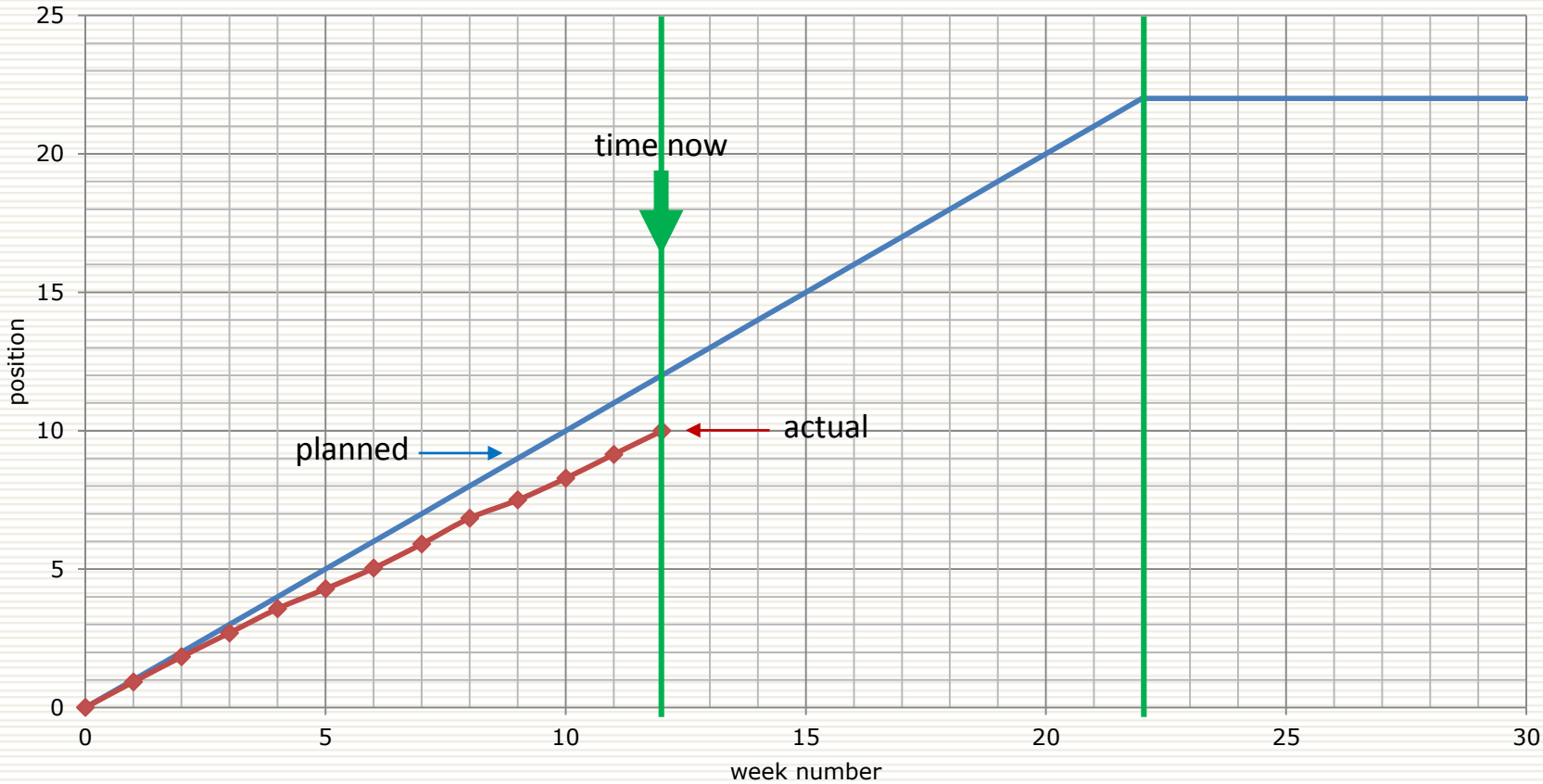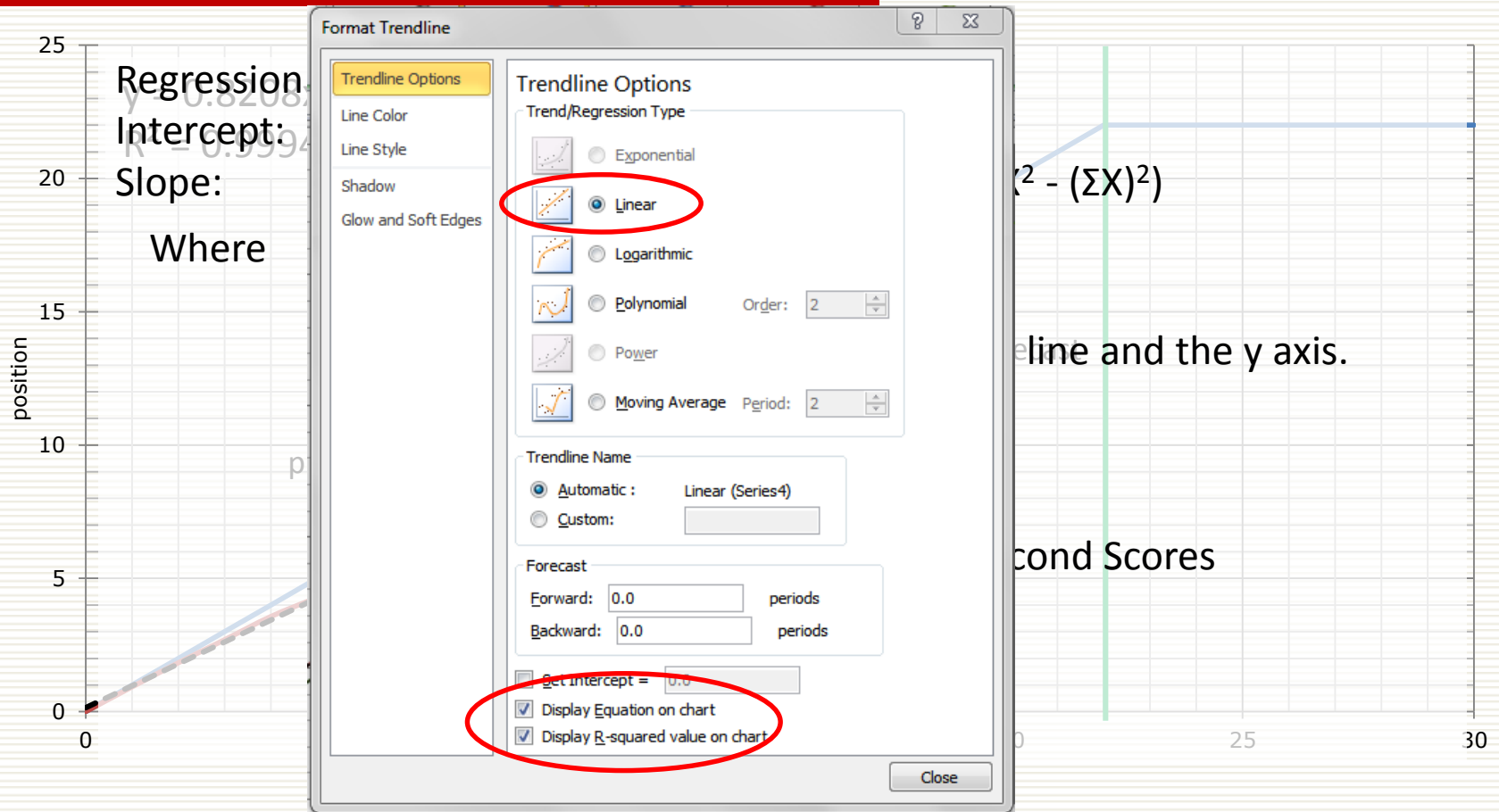
Simple Linear Regression
The Forecast Model

Simple Linear Regression
The Forecast Model

Project Controls EXPO
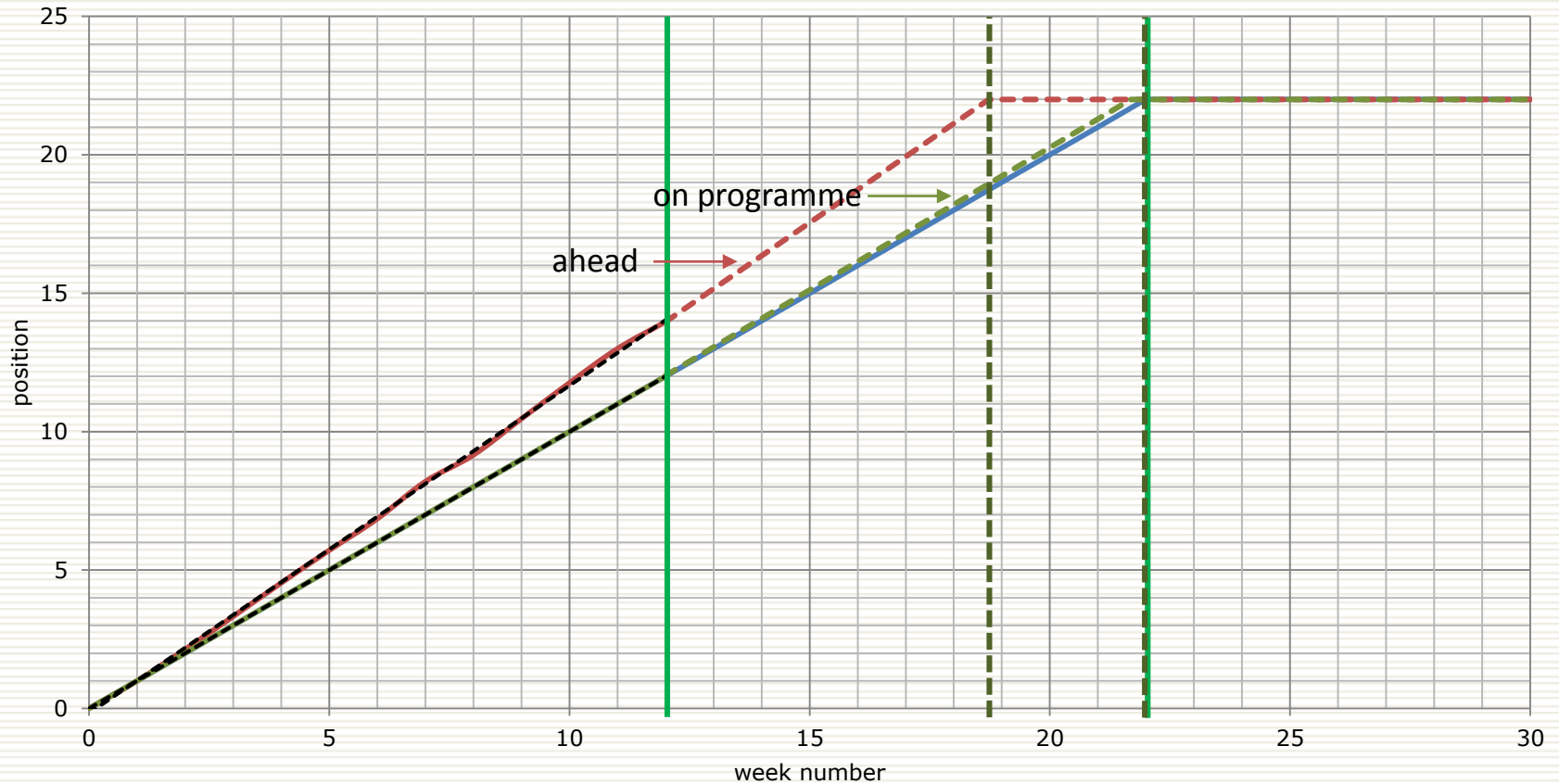
Project Recovery

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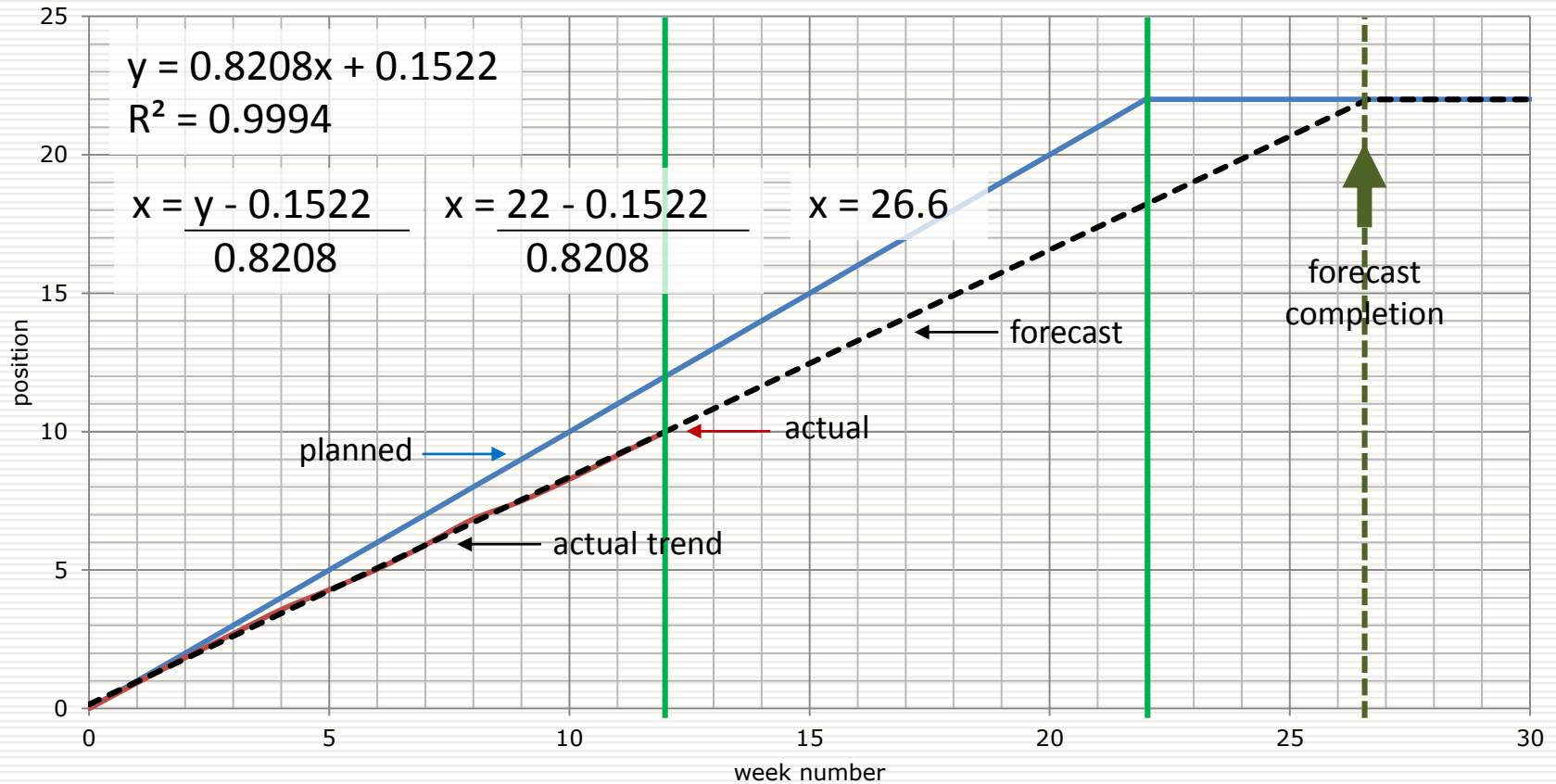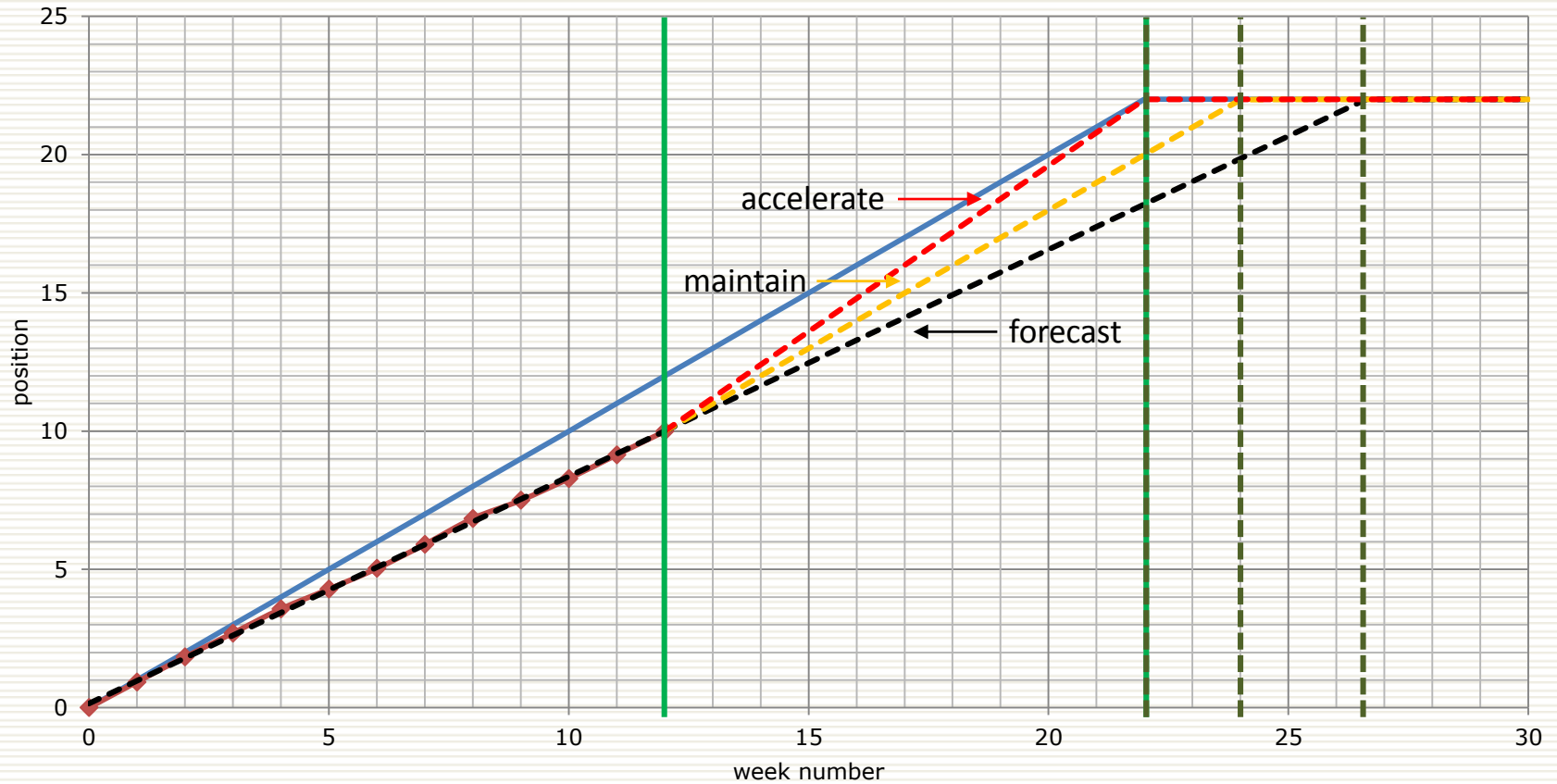
Ahead and On Programme

24

Conclusion

❑ **Simple linear regression**

- ▪ Takes account of all the position data

- ▪ Presents in simple straight-line graphs

- ▪ Understood by non-specialists

- ▪ Trends are easier to understand

- ▪ Change needed to bring the project back on schedule is straightforward to see.

❑ Progress trends tend to be influenced by leadership, management, resources, experience and strategy decisions.

❑ Progress > Position > Prediction > Profitability

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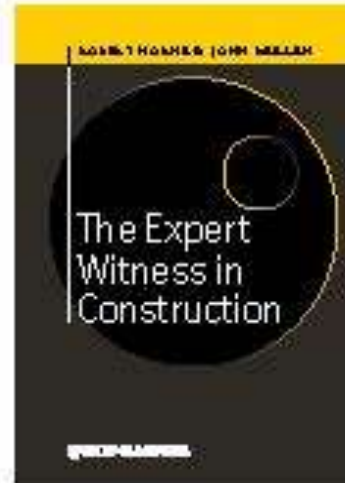E X P O

Questions?

A Handbook for
Construction Planning and Scheduling

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John Mullen
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www.driver-group.com

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