



Project Controls
E X P O



Project Controls Expo – 18th Nov 2014 Emirates Stadium, London

**The Computer Age and Estimating – Don't
Forget the Fundamentals**

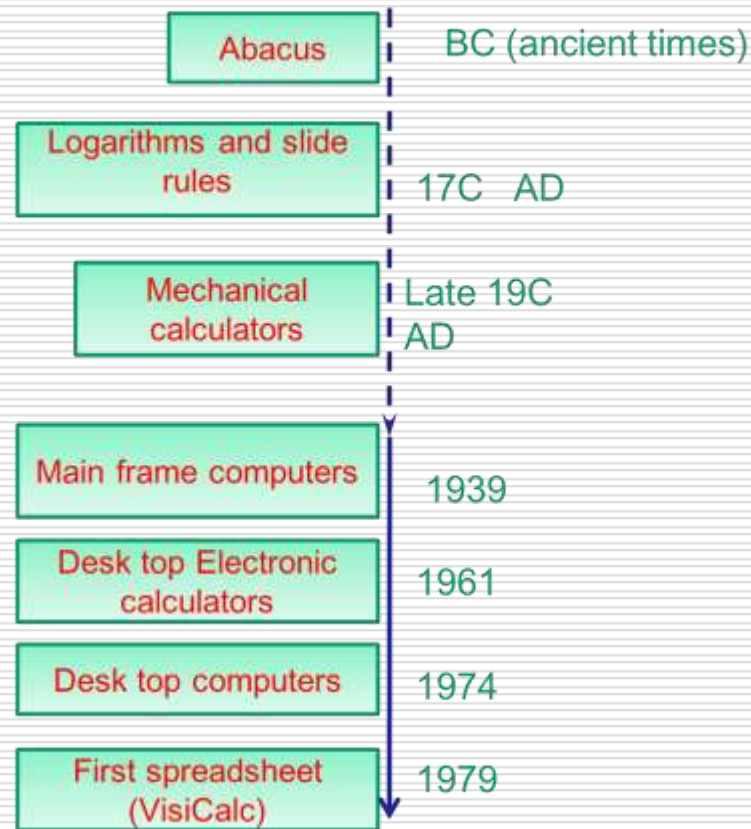


About the Speaker

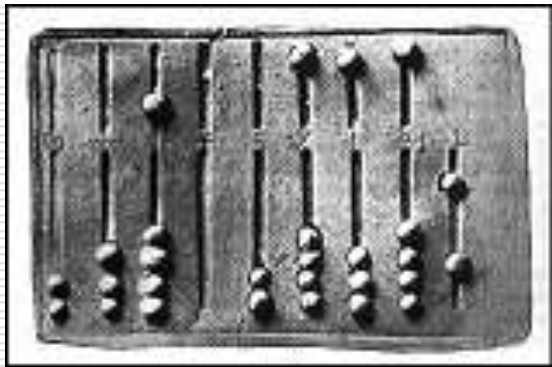
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Currently engaged as an Assessor for the Qualification Credit Framework (QCF) programme in Project Controls and as a course Presenter. Career spent in EPCM embracing project engineering/management and Techno-economic evaluation.

Calculation Technology



Calculators



Old Metal Abacus
- for new recruits



Golden Abacus – suitable for Manager of Project Controls (or retirement gift)

<http://www.abacus.ca/abacus-images.php>

Calculators



Modern
electronic
calculator with
back-up Abacus

<http://www.abacus.ca/abacus-images.php>

Calculators



Construction
Phase model

<http://www.abacus.ca/abacus-images.php>



Calculation Technology

Present Day

Multitude of sophisticated software packages, generally still supplemented by purpose-designed spreadsheets

Calculation Technology

Use of sophisticated software packages without an understanding of the fundamentals

- misuse  errors

- not using to full potential

Stifling creativity





What do we want to achieve?

Ensure the understanding and application of sound, basic principles is applied

- in the selection and use of the most cost effective software
- in the use of that unique God-given attribute, “creativity” when refining software or developing purpose-designed spreadsheets (Computers will never be able to think!)



What is the Solution?

Sound knowledge (through training where necessary) of the fundamentals, prior to exposure to the selection and use of software packages



What are the Fundamentals?

- Definition of an Estimate

What is an estimate?

A prediction of **all** of the resources associated with executing a scheme of work of a **given scope** and at a **particular time**



What are the Fundamentals?

– Reasons for Preparing Estimates

- Component of Economic Feasibility studies
- For Functional Projects – public buildings (affordability)
- Budget control
- Change control
- Value engineering and constructability



What are the Fundamentals?

- Estimate Accuracy

ESTIMATE ACCURACY

The accuracy achievable depends primarily on the -

Level of project definition

What are the Fundamentals?

- Classification of Estimates

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic			
	LEVEL OF PROJECT DEFINITION Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1(a)
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorisation or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid / Tender	Detailed Unit Cost with Forced Detail Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid / Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Acknowledgement – AACE International

What are the Fundamentals?

- Estimate Preparation Methodology



3 Basic Methodologies
each with own characteristics and
principles which need to be understood
and applied



What are the Fundamentals?

- Estimate Preparation Methodology

1. Parametric/Capacity factored

- Capital cost related to a major parameter - use of formula
e.g. total throughput/size vs cost relationship
- Used for: Class 5 Estimates
- End Use: Concept screening



What are the Fundamentals?

- Estimate Preparation Methodology

2. Equipment Factored

Takes a major component of the total cost for which costs can be established without a great deal of detailed design (e.g. total equipment cost) and uses cost relationships, determined from previous, similar, projects to estimate other cost components.

Used for: Class 4 and portion of Class 3

End use: Study or Feasibility (Class 4) Budget Authorisation/Control (Class 3)

What are the Fundamentals?

- Estimate Preparation Methodology



2. Equipment Factored – contd

- Requires rigorous data capture and analysis from completed projects (Project Close-out Cost Report) - very often neglected but vital source of cost data
- Cost codes set up to allow derivation of factors

What are the Fundamentals?

- Estimate Preparation Methodology



3. Detailed Estimating

Quantity x unit cost

Requires detailed design

Used for: Class 3 (Part) and Classes 2 and 1

End Use:

Budget Authorisation or cost control – project execution stage (Classes 2 and 3); or Bid/Tender for fixed price lump sum (Class 2),

Check estimate or Bid/Tender (Class 1)



What are the Fundamentals? - Estimate Structure

Estimate Structure – internationally accepted practice for breaking down an estimate into its components of:

- Direct costs
- Indirect costs
- Other costs



What are the Fundamentals? - Other

- Work breakdown structure WBS
 - manageable units

- Cost codes
 - related to WBS



What are the Fundamentals? - Other

Scale-up/Scale-down techniques

- -Relationship of capacity/size of equipment or complete projects to cost (scaling exponents) to allow scale up/down of previous costs to new capacity/sizes
- Escalation/Cost Indices – to bring historical costs to present day

What are the Fundamentals? - Other



- Allowances
- Risk
- Contingency

What are the Fundamentals? - Other

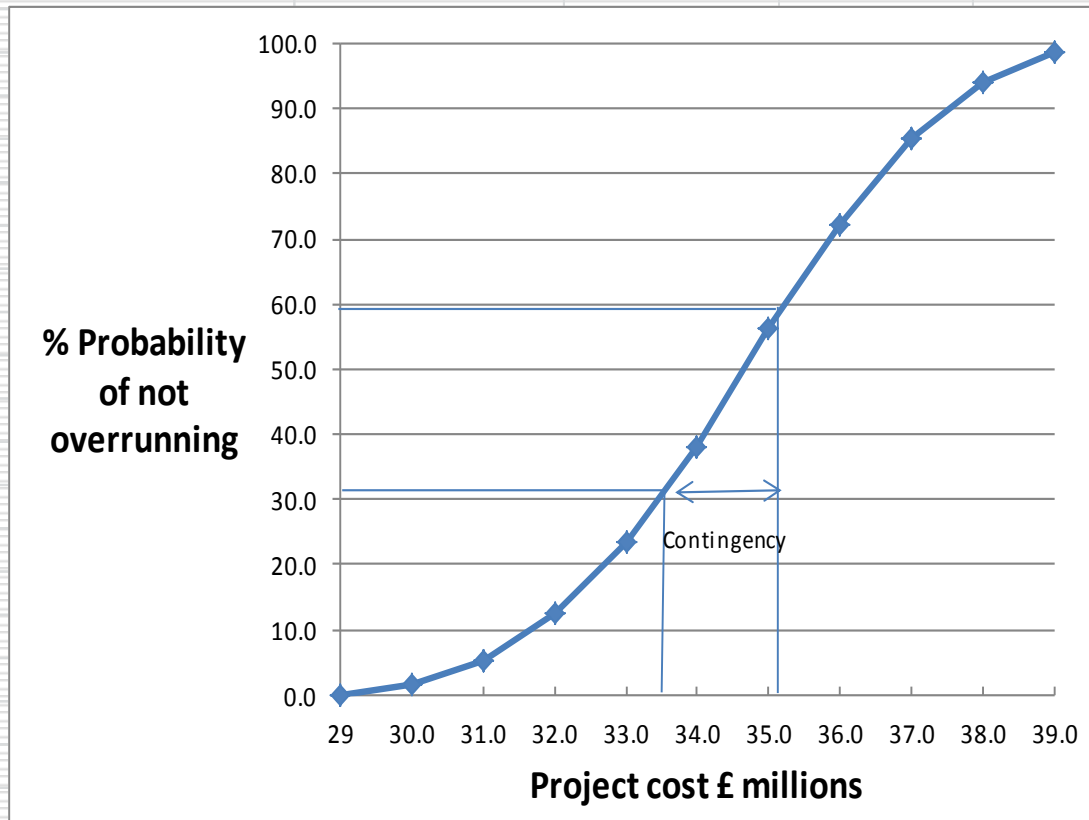


Steps in the Risk Management Process

- Risk Identification
- Risk analysis – assessment and ranking
- Risk Mitigation
- Risk Monitoring and Control

What are the Fundamentals?

- Risk and Contingency





What are the Fundamentals? - Other

Location Factors

- converting costs from one location/country to another – allowing for material and shipping, labour productivity, labour rate, and exchange rate differences



What are the Fundamentals? - Other

Cash Flow - Preparation of cash flow forecasts based on the estimated phased expenditure taking into account typical project schedule - design, procurement of equipment, procurement of materials and construction phases

Essential to ensure contract is financed in most cost effective way.

What are the Fundamentals? - Other



IT appreciation and data bases – the need to keep up to date with, and become involved with if possible, developments in proprietary software packages related to the field of estimating.



What are the Fundamentals? - Other

- Benchmarking
- Bid Evaluation
- Job procedures and Technical Work Practices
- Estimate backup/documentation
- Change control
- Estimate audits



What are the Fundamentals? - Other

- Use of capital and operating cost estimates in the vital role of carrying feasibility studies – basics of Whole Life Cycle Costing, Economic Evaluation using NPV/IRR and other techniques.

What are the Fundamentals? - Other



General Topics – concerned with good business relationships and practice

- Ethics,
- Duty of care,
- Confidentiality
- Effective working relationships
- Teamwork
- Conflict resolution
- Motivation



What should companies do?

- Ensure estimators are trained in the fundamentals prior to selection/use of proprietary software
- Avoid “black box” approach when using proprietary software.
- Run in-depth benchmarking trials of new software packages against recently completed project cost data.
- Allow time for data capture/analysis from completed projects and to obtain factors and to monitor “norms” used in estimates and project execution stage



Thank you for your attention – any questions?