International Cost Estimating and Analysis Association
Testable Topics List

CCEA

Testable Topics List

ICEAA International Cost Estimating and Analysis Association

The Testable Topics List

Cost Estimating Basics

COST ESTIMATING BASICS	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Applications of Cost Estimating	X			
Budgeting, Investment, and Planning	X			
Analysis of Alternatives (AoA)	X			
Economic Analysis	X			
Cost Benefits Analysis	X			
Business Case Analysis	X			
Contracting and Project Management	X			
Design and Trade-Off Decisions	X			
Requirements for Cost Estimating	X			
Limitations of Cost Estimating	X			
Types of Cost Estimates		X		
Life Cycle Cost Estimate (LCCE)		X		
Independent Cost Estimate (ICE)		X		
Budget Estimate		X		
Proposal Estimate		X		
Rough Order of Magnitude (ROM)		X		
Economic Analysis (EA)		X	X	
Analysis of Alternatives (AoA)		X	X	
Activity-Based Costing (ABC)		X	X	
Price-Based Acquisition estimates		X		
SORAP (Source of Repair) Analyses		X		
Logistics Support Analysis (LSA)		X		
Performance-Based Logistics (PBL)		X		
Cost Estimating Inputs and Products	X			
Requirements Documents	X			
Capabilities Development Document (CDD)	X			
Technical Baseline Description	X			
Technical Baseline Description	X			
Proposals	X			
Request for Information (RFI)	X			
Estimate Documentation	X			
Work Breakdown Structure (WBS) Development	X			X
WBS and Cost Element Structure (CES)	X			X
Program/System Baseline Definition	X			X
Data Collection, Normalization, and Analysis	X			
Cost Element Methodology	X			
Estimate Development and Validation	X			
Regression Analysis	X			

COST ESTIMATING BASICS	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Risk Analysis	X			
Time Phasing	X			
Cross-Checks	X			
Results and Report Generation	X			
Estimate Reconciliation	X			
Informal Reviews	X			
Formal Reviews	X			
Acquisition	X			
Milestone decisions	X			
Contracting	X			

Costing Techniques

COSTING TECHNIQUES	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Costing Techniques	X			
Analogy		X	X	X
Method	X			
Application	X	X	X	
Scaling/Adjustment		X	X	
Advantages and Disadvantages	X			
Quantification of Uncertainty		X	X	
Parametric		X		
Build-Up		X		
Life Cycle Cost Elements	X			
Adequacy of program definition	X			
Availability of data				X
Top-Down vs. Bottom-Up Approaches	X			
Cost Element Structure (CES)	X			
Calibration	X	X		
Comparison of Techniques				X
Schedule Estimating and Time Phasing	X	X	X	X
Adjusting Analogies	X	X	X	

Parametric Estimating

Parametric Estimating	CCEA®			
TOPIC	**Part I or PCEA®**		**Part II**	
	Foundational Knowledge	**Practical Application**	**Advanced Analysis**	**Case Study**
Parametric Estimating Concepts	X			
Slope	X	X	X	
Parametric Estimating Process	X			
Cost Driver Identification	X	X	X	X
Cost Drivers	X			X
Proxy Variables		X	X	X
Dummy Variables	X	X	X	X
Cost Estimating Relationship (CER) Development		X	X	
Rates, Factors, and Ratios		X	X	
Regression	X	X	X	X
Calibration		X	X	
Parametric Model Development		X	X	
Validation of Parametric Inputs		X	X	X
Cost Response Curves (CRCs)		X	X	

Data Collection and Normalization

Data Collection and Normalization	CCEA®			
TOPIC	**Part I or PCEA®**		**Part II**	
	Foundational Knowledge	**Practical Application**	**Advanced Analysis**	**Case Study**
Data Collection Process	X			X
Data Collection Techniques	X			X
Data Collection Issues	X			X
Contextual Completeness		X	X	
Availability		X	X	
Accessibility		X	X	
Validity		X	X	
Timeliness		X	X	
Sampling / Measurement Error		X	X	
Data Normalization	X			
Cost Units		X	X	
Inflation		X	X	
Overhead Changes		X	X	
Non-Recurring vs. Recurring Cost		X	X	
Direct vs. Indirect Cost		X	X	
Direct Labor		X	X	
Material Costs		X	X	
Overheads		X	X	
Fringe		X	X	

Data Collection and Normalization	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
General and Administrative (G&A)		X	X	
Profit/Fee		X	X	
Cost Accounting Systems and Standards	X			X

Index/Inflation

Index/Inflation	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Inflation and Cost Estimating				X
Inflation Concepts and Definitions	X			
Inflation and Escalation	X	X	X	
Escalation vs. Discounting	X	X	X	
Index Numbers	X	X	X	
Current-Year dollars	X	X	X	
Constant-Year dollars	X	X	X	
Then-Year (budget-year) dollars	X	X	X	
Base-Year dollars	X	X	X	
Inflation Indices	X	X	X	X
Raw indices		X	X	
Composite Indices		X	X	
Weighted Average		X	X	
Inflation Procedures	X	X	X	X
Index Tables		X	X	
Shifting Base Year of tables		X	X	
Inflation Procedure Mnemonic		X	X	
CY$ to CY$		X	X	
CY$ to TY$		X	X	
TY$ to CY$		X	X	
TY$ to TY$		X	X	
Consumer Price Index (CPI) and Commercial Indices		X	X	X
Time Phasing and Inflation		X	X	X

Basic Data Analysis Principles

Basic Data Analysis Principles	CCEA®			
TOPIC	**Part I or PCEA®**		**Part II**	
	Foundational Knowledge	**Practical Application**	**Advanced Analysis**	**Case Study**
Types of data	X			X
Quantitative	X	X	X	
Univariate		X	X	
Bivariate		X	X	
Multivariate		X	X	
Time Series		X	X	
Qualitative	X			
Univariate Visual Display of Data	X			X
Histograms		X	X	
Box plots	X			
Stem-and-leaf plots	X			
Pie charts	X			
Univariate Descriptive Statistics		X	X	X
Measures of Central Tendency	X			X
Mean		X		X
Median		X		X
Mode		X		X
Measures of Dispersion	X			X
Range	X			
Variance				X
Standard Deviation				X
Coefficient of Variation (CV)				X
Univariate Inferential Statistics	X	X	X	X
t test for means			X	X
Chi-Square and K-S tests for distribution			X	X
Bivariate Visual Display of Data	X	X		
Scatter plots	X			
Variables				X
Cost vs. time				X
Cost vs. parameter				X
Cost vs. cost				X
Function types	X			X
Data Validation				X
Outliers		X	X	X
Other types of analysis	X			
Time series analysis		X		
Non-parametric analysis		X		
Systems of simultaneous equations		X	X	

Learning Curve

Learning Curve	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Learning Curve Theory	X			X
Learning Curve Concepts	X	X		
Slope		X	X	
Theoretical First Unit (T1)		X	X	
100th Unit Cost ???		X	X	
Equation		X	X	
Learning Curve Data	X	X	X	
Unit Cost Data		X	X	
Cumulative Cost Data		X	X	
Cumulative Average Cost Data		X	X	
Unit with Rate		X	X	
Lot Data		X	X	
Cumulative Average Learning Curve Theory (CUMAV)	X	X	X	
Unit Learning Curve Theory (ULC)	X	X	X	
Lot Data and Lot Midpoints (LMP)	X	X	X	
Learning Curve Application	X	X	X	X
Choosing a Learning Curve Theory		X		
Fitting a Learning Curve			X	
Learning Curves for New Programs			X	
Learning Curves During the First Few Units			X	
Factors Affecting Slope		X		
Advanced Topics				X
Production Rate Effects	X			
Learn-rate curves		X	X	
Fixed cost curves		X	X	
Production Break Effects	X	X	X	
Break Point		X	X	
Andelohr		X	X	
New Work Effects	X	X	X	
Quantity As an Independent Variable (QAIV)	X	X	X	
Prototypes and Step-Up/Step-Down Factors	X			

Regression Analysis

Regression Analysis	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Linear Relationships	X			
Correlation	X	X	X	
Causation	X			
Types of Models	X			
General Linear Model	X	X	X	X
Linear Regression	X	X	X	X
Assumptions for Linear Regression Models	X			
Finding the Equation		X	X	
Residual Analysis		X	X	
Cook's Distance Measure (Identify Influential Observations)		X	X	
Goodness of Fit	X	X	X	
Analysis of Variance (ANOVA)	X	X	X	
SSR		X	X	
SSE		X	X	
SST		X	X	
Uncertainty		X	X	
Standard Error		X	X	
Coefficient of Variation (CV)		X	X	
Statistical Significance		X	X	
Significance Level		X	X	
t statistic		X	X	
F statistic		X	X	
Mean Square Error (s-squared or MSE)		X	X	
Explained Variation		X	X	
R-squared		X	X	
Confidence Intervals	X	X	X	
Prediction Intervals		X	X	
Point Estimation		X	X	
Small Sample Size Considerations in Regression Analysis				X
Non-linear Models	X	X	X	X
Multivariate Regression Analysis	X	X	X	X
Least Squares Method		X	X	
Adjusted R-squared		X	X	
Multicollinearity		X	X	
Signs of Multicollinearity		X	X	
Tests for Multicollinearity		X	X	
Selecting the Best Model		X	X	X
Selecting "Within Type"		X	X	

Regression Analysis	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Selecting "Across Type"		X	X	
Generalized Least Squares		X	X	

Cost Risk Analysis

Cost Risk Analysis	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Risk Definitions	X			
Risk Process	X	X		X
Risk and Uncertainty	X			X
Relationship between Risk and Cash Flow	X			
Relationship between Risk and Profit	X			
Risk Management Structure				X
Risk Assessment	X			
Risk Analysis and Sensitivity Analysis		X	X	
Risk Handling	X			
Risk Sources and Responsibilities	X			X
Cost Growth	X			
Cost Growth Causes	X			
Cost Growth Allowances		X	X	
Types of Cost Risk	X			X
Supportability Risk				X
Cost Estimating Risk	X			
Schedule/Technical Risk	X			
Historical Cost Growth	X			
Variations Risk Distributions w/Impacts				X
Triangles, Weibull,lognormals, and normals		X	X	
Risk Analysis vs. Sensitivity Analysis	X	X	X	
Independence and Cost Realism	X			X
Risk and EVM		X	X	
Predicting EAC		X	X	
Methods and Techniques				X
Bottom-up Approach	X			
Top Down Approach	X			
Schedule Risk Analysis	X	X	X	
Monte Carlo/Hyperlatin Cube	X	X	X	X
Decision Tree Analysis	X	X	X	X
Size Adjustments				X
Risk Adjusted Net Present Value		X	X	

Cost Risk Analysis	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Adjusting for Total Project Risk	X	X	X	X
Payback Approach	X	X	X	
Simulation Analysis	X	X	X	
Sensitivity Analysis	X	X	X	
Risk Adjusted Discount Rate Approach	X	X	X	
Functional, Relational, and Injected Correlation	X			
Risk Model Architecture		X	X	X
Decision Process and Modeling				X
Applying uncertainty to cost elements				X
Selecting Distributions				X
Inputs – Scoring/Parameters		X	X	
Inputs – Dollar Basis/Forecasting		X	X	
Structure – Organization		X	X	
Coverage and Partition		X	X	
Assigning Cost to Risk		X	X	

Probability and Statistics

Probability and Statistics	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Sampling Techniques	X			
Hypothesis Testing	X	X	X	
Probability Density Functions	X	X	X	
Probability Theory	X			
Expectation of a Random Variable	X	X	X	
Standard Deviation of a Random Variable	X	X	X	
Covariance and Correlation of a Random Variable	X	X	X	
Mean, Median, Mode, Range	X	X	X	
Cumulative Distribution Function	X	X	X	
Types of Distributions	X			X
Normal	X	X	X	X
Student T	X	X	X	X
Lognormal	X	X	X	X
Chi Square	X	X	X	X
F	X	X	X	X
Triangular	X	X	X	X
Uniform	X	X	X	X
Beta	X	X	X	X
Gamma	X	X	X	X

Probability and Statistics	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Weibull	X	X	X	X
Exponential	X	X	X	X
Other Common Distributions	X			X
Discrete Distributions	X			X
Bernoulli	X			X
Binomial	X			X
Poisson	X			X
Geometric	X			X
Relationships between Distributions	X			
Hypothesis Testing	X	X	X	X
Null Hypothesis and Alternative Hypothesis	X	X	X	
One-Tail vs. Two-Tail Tests	X	X	X	
Statistical Significance	X	X	X	
Type I and Type II Errors	X	X	X	
Test Statistic		X	X	
Critical Value		X	X	
P-Values		X	X	
Confidence Intervals	X	X	X	
Statistical Tests	X	X	X	X
t test	X	X	X	
One-sample	X	X	X	
Two-sample	X	X	X	
Chi Square test	X	X	X	
F test	X	X	X	
k-Sample test for means	X	X	X	
Kolmogorov-Smirnov goodness of fit	X	X	X	
Related Topics				
Probability	X	X	X	
Simulation	X			
Discrete-Event	X			
Time Series Analysis		X	X	
Moving Average		X	X	
Weighted Moving Average		X	X	
Exponential Smoothing		X	X	

Manufacturing Cost Estimating

Manufacturing Cost Estimating	CCEA®			
TOPIC	**Part I or PCEA®**		**Part II**	
	Foundational Knowledge	**Practical Application**	**Advanced Analysis**	**Case Study**
Absorption Costing	X			X
Burden	X			X
Cost Center	X			X
Differential Cost	X			X
Fixed Cost	X			X
Forward Pricing	X			X
Incremental Cost	X			X
Job Order Costing	X			X
Marginal Cost	X			X
Performance Factors	X			X
Process Costing	X			X
Variable Cost	X			X
Composite Labor Rates	X	X	X	X
Non-Recurring	X			X
Tooling	X			
Test Equipment	X			
Facilities	X			
Production Set-Up	X			
Recurring	X			X
Labor		X	X	
Material		X	X	
Overhead / Indirect / Capital Expenditures		X	X	X
Overhead		X	X	
Fringe		X	X	
General and Administrative (G&A)		X	X	
Cost of Money (COM)		X	X	
Fee		X	X	
Labor Estimating	X			X
Time Standards	X			
Personal Fatigue & Delay	X			
Support Labor	X			
Labor Concerns	X			
Learning Curve	X	X	X	
Production Breaks	X	X	X	
Green Labor	X			
Process Improvements	X			
Equipment Utilization Rate	X			
Make or Buy	X			

Manufacturing Cost Estimating	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Rates Estimating	X			
Material Estimating	X			X
Material Costs	X			
Raw Material	X			
Purchased Parts	X			
Subcontractor Costs	X			
Types of Material	X			

Software Cost Estimating

Software Cost Estimating	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Software Development Process	X			X
Comparison to Hardware	X			
Cost Drivers	X			X
Size	X			X
Source Lines Of Code (SLOC) (New, Modified, Re-used, auto-generated)	X			X
Code Reuse and Equivalent SLOC (ESLOC)	X	X	X	X
Equivalent Source Lines of Code (ESLOC)	X	X	X	
SLOC Growth	X			
How to capture effort on a project		X	X	X
Productivity		X	X	X
The elements of a complete development effort (SM, Requirements, Cost Unit Test, CSCI to CSCI test and integration, QM QA, Overall system integration and test, etc)	X			
Function Points	X	X	X	
Object Points	X			
Complexity	X			
Capability	X	X	X	
Schedule (Dr. Boehm's basic predicting equations)	X	X	X	
SW Maintenance	X			
Industry Rules of Thumb	X			
Life Cycle Methodologies	X			X
Waterfall	X			
Incremental	X			
Evolutionary	X			
Spiral	X			
Estimating Techniques Applied to Software	X	X	X	
Industry Standards/Rules of Thumb	X	X	X	X

Economic Analysis

Economic Analysis	CCEA®			
TOPIC	**Part I or PCEA®**		**Part II**	
	Foundational Knowledge	**Practical Application**	**Advanced Analysis**	**Case Study**
Discounted Dollars	X	X	X	
Economic Life	X	X	X	
Opportunity Cost	X	X	X	
Present Value of Money	X	X	X	
Time Value of Money	X	X	X	
Breakeven Analysis	X			X
Cost-Benefit Analysis	X			X
Discounting and Capital Budgeting	X			X
Principles of Economic Analysis (EA)	X			
Definition and Purpose	X			X
Economic Life Cycle	X			X
Period of Analysis	X			
Type of Dollars	X			
Constant Dollars		X	X	
Current Dollars		X	X	
Base Year		X	X	
Costs	X			
LCC	X			
Opportunity costs	X			
Status Quo phase-out costs	X			
Sunk costs	X			
Wash costs	X			
Benefits	X			
Compare and Rank Alternatives			X	X
Time Phasing		X	X	
Base year v. Current year		X	X	
Compound V. composite rates		X	X	
Inflation		X	X	
Discounting		X	X	
Present Value		X	X	
Real Discount Rates	X			
Nominal Discount Rates	X			
Discount Factors (mid-year and end-of-year)	X			
Comparison Techniques		X	X	
Net Present Value (NPV)		X	X	X
Uniform Annual Cost (UAC)		X	X	
Benefit/Cost Ratio (B/CR)		X	X	
Savings/Investment Ratio (SIR)		X	X	
Payback Period Analysis		X	X	
Return on Investment (ROI)		X	X	

Economic Analysis	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Benefit to Investment Ratio (BIR)		X	X	
Break-Even Analysis		X	X	
Test Sensitivity of Alternative Rankings				X

Contract Pricing

Contract Pricing	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Allowable Costs	X			X
Ceiling Price	X			X
Fee	X			X
Not-to-Exceed Cost	X			X
Profit		X	X	X
Revenue	X			X
Contract End Items		X		X
Fixed Price		X	X	X
Firm Fixed Price (FFP)		X	X	
Fixed Price Incentive (FPI)		X	X	
Firm and Successive Targets		X	X	
Ceiling Price		X	X	
Point of Total Assumption (PTA)		X	X	
Share Ratios		X	X	
Cost Plus		X	X	X
Cost Plus Award Fee (CPAF)		X	X	
Cost Plus Incentive Fee (CPIF)		X	X	
Minimum and maximum fee		X	X	
Cost Plus Fixed Fee (CPFF)		X	X	

Earned Value Management

Earned Value Management	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
EVMS Purpose and Benefits	X			
EVM Components	X			X
Integrated Baseline	X			
Resource-Loaded Schedule = Time-Phased Budget	X			
Work Breakdown Structure (WBS)	X			

Earned Value Management	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Organizational Breakdown Structure (OBS)	X			
Performance Measurement Baseline (PMB)	X			
Management Reserve (MR)	X			
Contract Budget Base (CBB)	X			
Earned Value Data Elements	X			X
Planned Value (PV) = Budgeted Cost of Work Scheduled (BCWS)		X	X	
Earned Value (EV) = Budgeted Cost of Work Performed (BCWP)		X	X	
Actual Cost (AC) = Actual Cost of Work Performed (ACWP)		X	X	
Budget At Complete (BAC)		X	X	
Latest Revised Estimate (LRE)		X	X	
Cost Variance (CV)		X	X	
Schedule Variance (SV)		X	X	
Estimate At Complete (EAC)	X			
Variance At Complete (VAC)	X			
To-complete Cost Performance Index (TCPI)	X			

Cost Management

Cost Management	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Design-to-Cost	X			
Design of Experiment	X			
Measures of Effectiveness	X			X
Cost-Effectiveness Analysis	X			X
Cost-Performance Tradeoff Analysis	X			X
Objectives of Cost Management	X			
Total Ownership Cost (TOC)	X			X
Life Cycle Costing	X			
Linked Indirect Costs	X			
TOC Reduction and Cost Management	X			
Cost As an Independent Variable (CAIV)		X	X	X
CAIV Definition	X			
Cost/Performance Trades	X			
Linkage	X			
Exchange Rate	X			
Dominance	X			
"Bang for the buck"	X			
Role of Cost Estimating	X			

Cost Management	CCEA®			
TOPIC	Part I or PCEA®		Part II	
	Foundational Knowledge	Practical Application	Advanced Analysis	Case Study
Performance Estimating Relationships (PERs)	X			
Target Costing	X			
Evolution of Target Costing	X			
Target Costing Definition	X			
Price led	X			
Customer focused	X			
Design centered	X			
Cross functional	X			
Life-cycle oriented	X			
Value-chain based	X			
Target Costing vs. CAIV		X	X	
Target Costing Tools	X			
Benefits of Target Costing	X			
Activity Based Costing (ABC)		X	X	X
ABC Model		X	X	
Resources		X	X	
Activities		X	X	
Outputs (Cost Objects)		X	X	
ABC and Activity-Based Management (ABM)		X	X	