Escalation Estimation

Working With Economics Consultants

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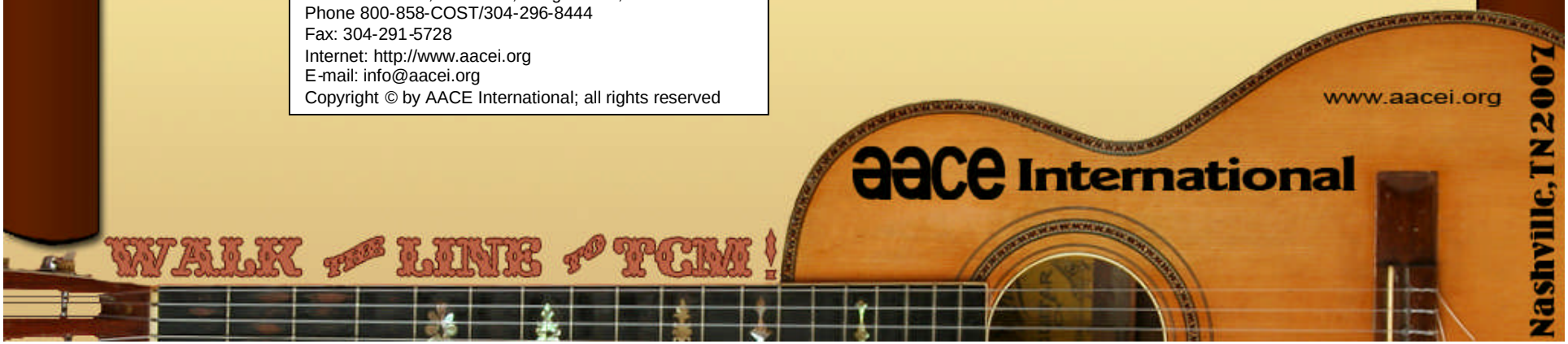
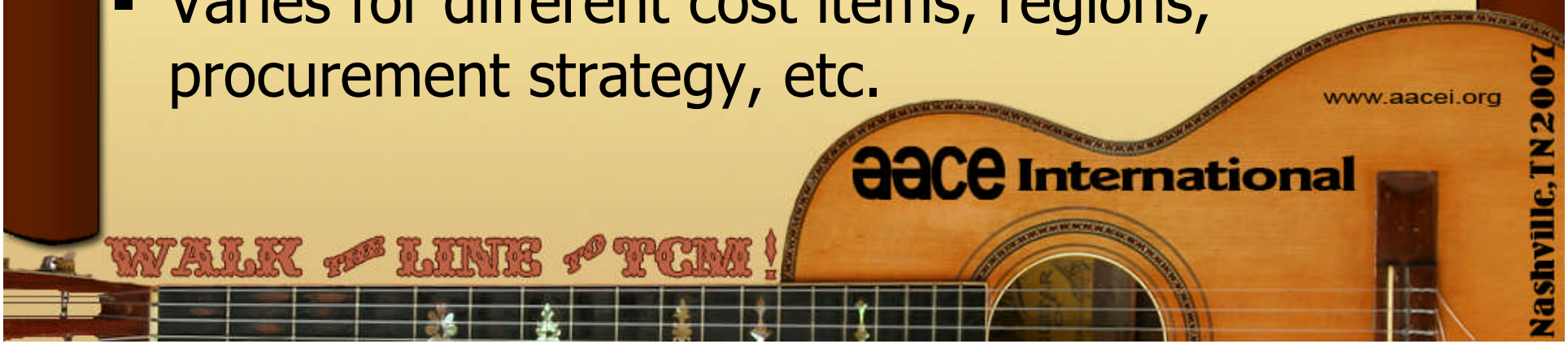


Objectives

- Review some escalation basics
- Describe why escalation estimating is such a challenge
- Describe an effective approach to escalation estimating

Escalation Basics; Definitions

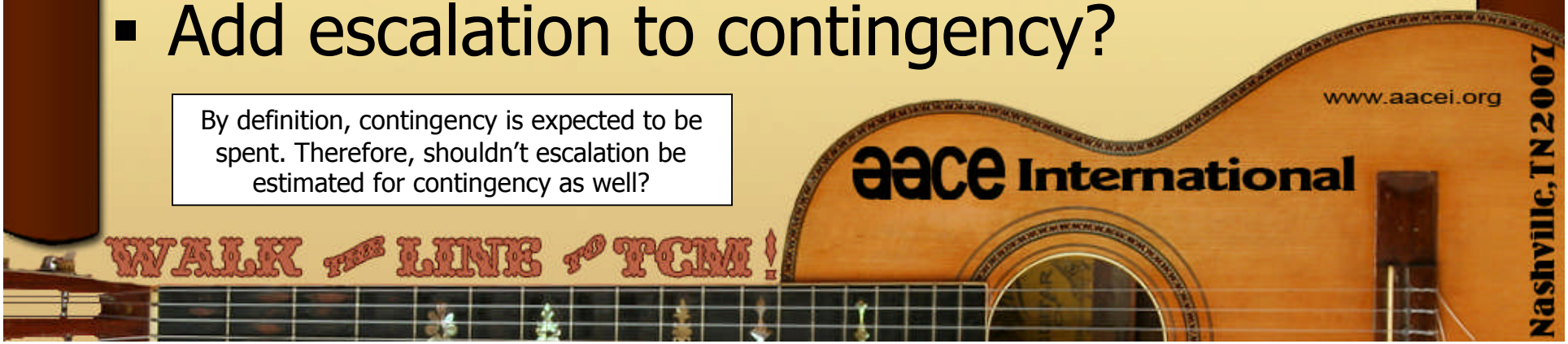
- Changes in price levels driven by underlying economic conditions
- Reflects changes in price-drivers such as productivity and technology as well as changes in market conditions such as high demand, labor shortages, profit margins and so on
- Includes, but differs from inflation which is a caused by debasement of a currency
- Varies for different cost items, regions, procurement strategy, etc.



Escalation Basics; Risk Issues

- Escalation is a unique "risk" cost that must be estimated and budgeted for
  - Can be included in item budgets or given its own account that is managed
- By AACE's definition, contingency specifically excludes escalation although both are "risk" funds
- Probabilistic estimating approaches best
- Add escalation to contingency?

By definition, contingency is expected to be spent. Therefore, shouldn't escalation be estimated for contingency as well?



Escalation Basics; Price Indices

- Indices are measures of price levels, usually normalized (e.g., 1990 = 1.00)
- Economists forecast future price indices
  - Correlate outcomes of their macroeconomic models to trends for specific price indices
- Escalation is typically estimated using index ratios

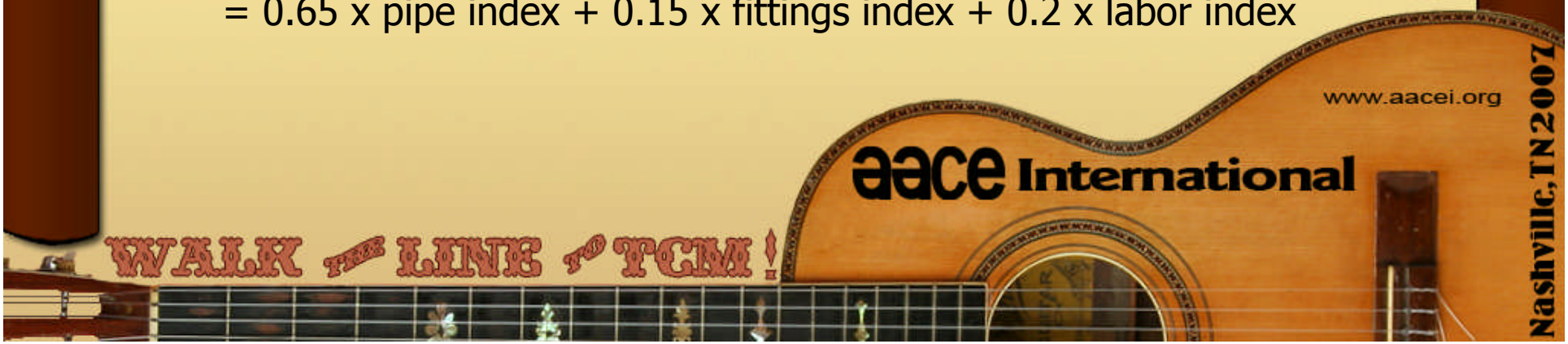
= $base x [(index for date committed)/(index for est. basis date)-1]

= $100 x [1.15/1.00 -1] = $100 x 0.15 = $15

Escalation Basics; Composite Indices

- The items we buy often do not have a corresponding index
- For example, the price of fabricated pipe includes pipe, fittings, and shop labor and overhead costs
- A example weighted composite index for piping material may then be:

  = 0.65 x pipe index + 0.15 x fittings index + 0.2 x labor index

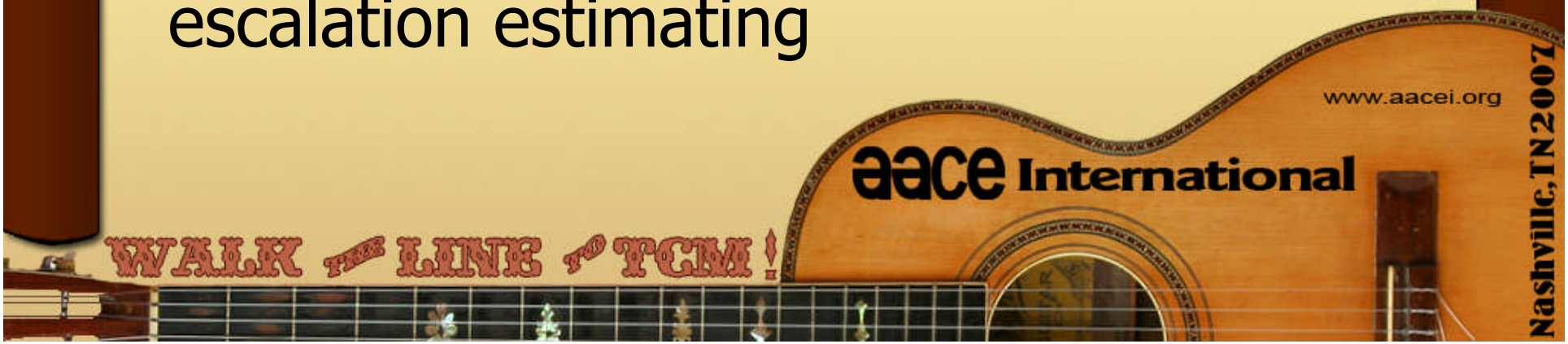


Escalation Basics; Cash Flow

- To apply the indices, we need to know when the future costs will be committed by the cost accounts we are going to use
  - Annual costs are usually adequate
- Can obtain cash flow via resource loading the schedule, cash flow models, etc.

Escalation Basics; Normalization

- Estimators must often use old estimates or actual project cost records
- To be useful, the old cost data needs to be "normalized" to a selected basis in terms of time, currency, and location
- Normalizing costs for time uses historical price indices is a similar way as used for escalation estimating



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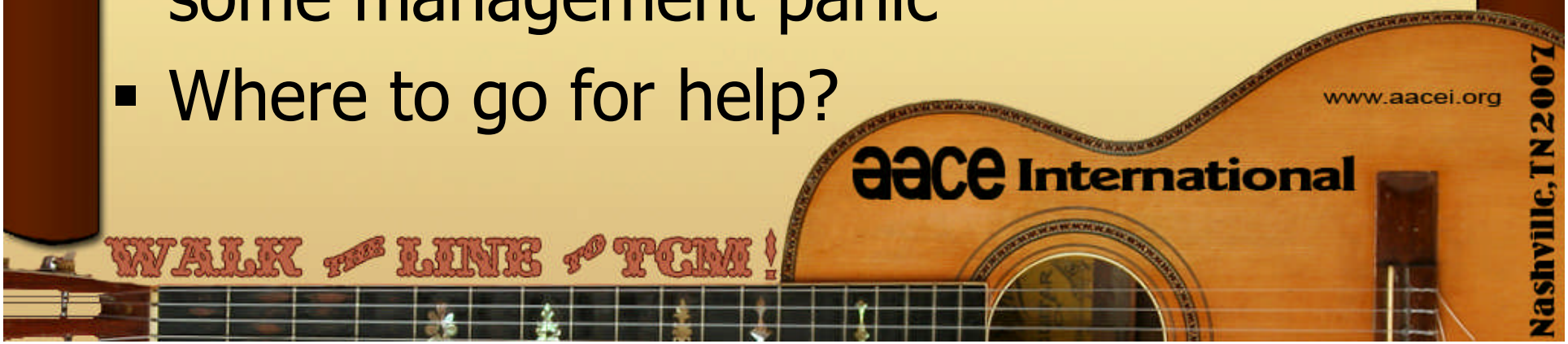
First Challenge: Prices Gone Wild

- Since 2003, prices for many commodity items have skyrocketed

Commodity Items	Price Increase (9/03 to 9/06)
#2 Diesel Fuel	121%
Iron & Steel	60%
Iron Ore	41%
Non-Ferrous Metals	85%
Industrial Chemicals	55%
Cement	32%

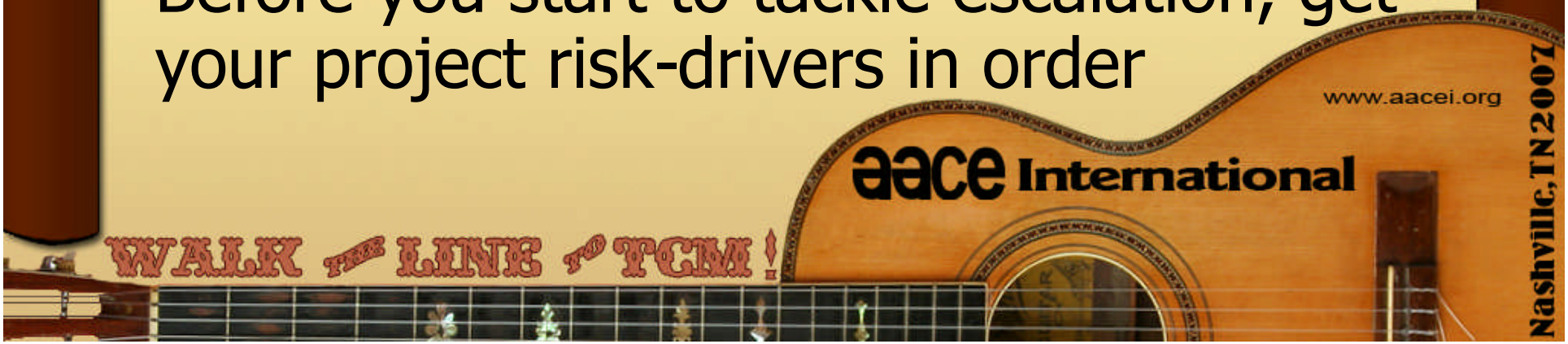
Cost Estimator's Caught Off-Guard

- Until 2003, most estimators had not worried much about escalation since capex collapse in 1985
- In 2004, estimators found that published indices were not tracking prices for EPC services (wages ≠ contractor prices)
- Project cost explosions were triggering some management panic
- Where to go for help?



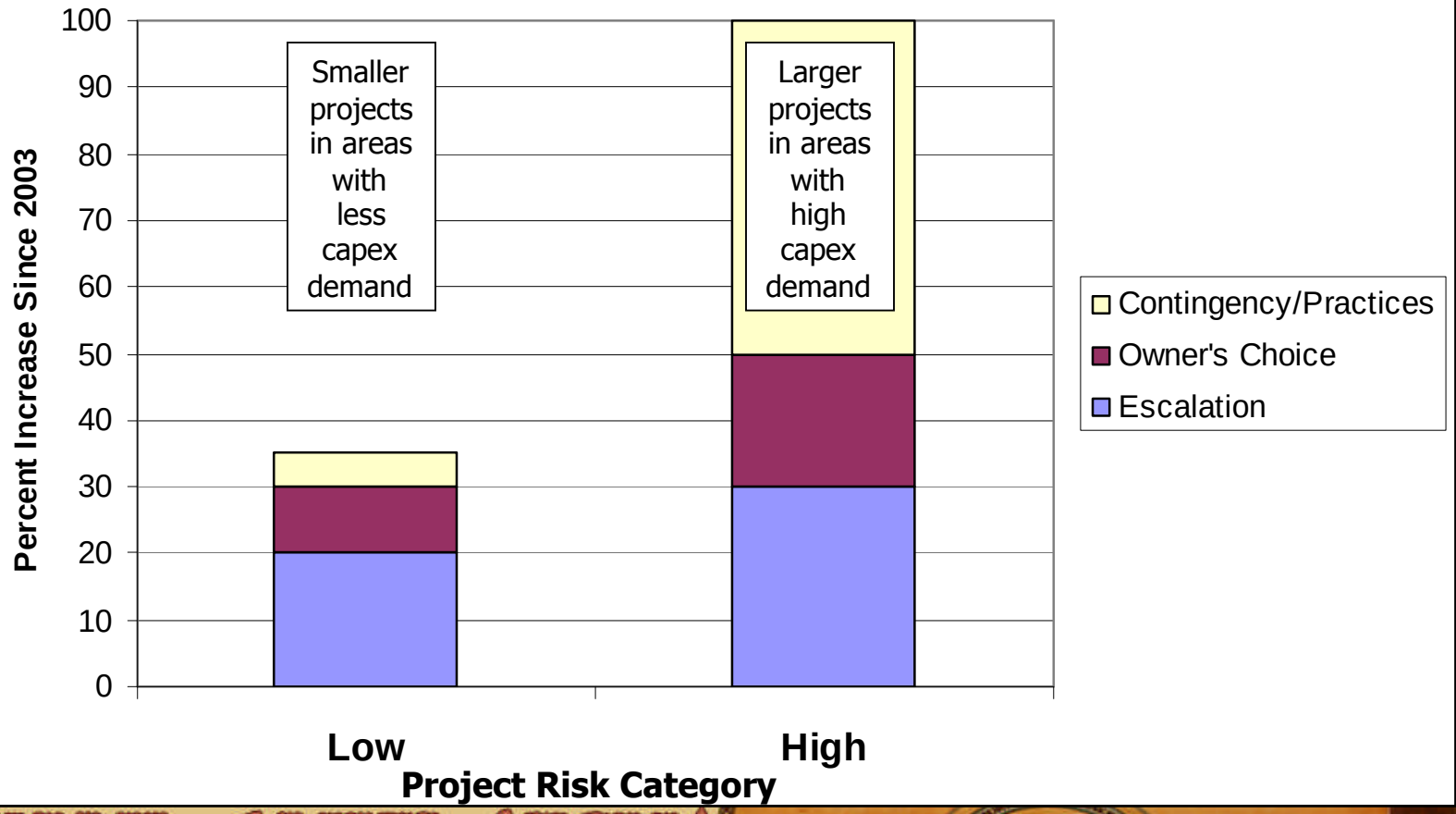
Next Challenge: Sorting Out Escalation Vs. Contingency

- Project cost explosions trigger fear
  - Alberta, Sakhalin, W. Australia, etc.
- However, much of the cost increase has been the result of poor project practices
  - Escalation was the straw that broke the weak project's back (but a convenient scapegoat for management to hide behind)
- Before you start to tackle escalation, get your project risk-drivers in order



What is Happening to Project Costs?

When markets are tight and prices volatile, projects are subject to disruption, delays, and poor productivity. Weak mgmt and control leads to huge cost growth (particularly for engr. and constr. labor).



Next Challenge: Index Shortcomings

- As rules-of-thumb quit working (e.g., 3% per year), estimators looked for index forecasts that were specific to those cost accounts that were volatile
- Estimators found that economists have forecasts of indices, but…
  - ..while some items tracked well (e.g., steel)
  - ..other key items not tracked at all (e.g., engineering and construction)

Example of Index Shortcomings

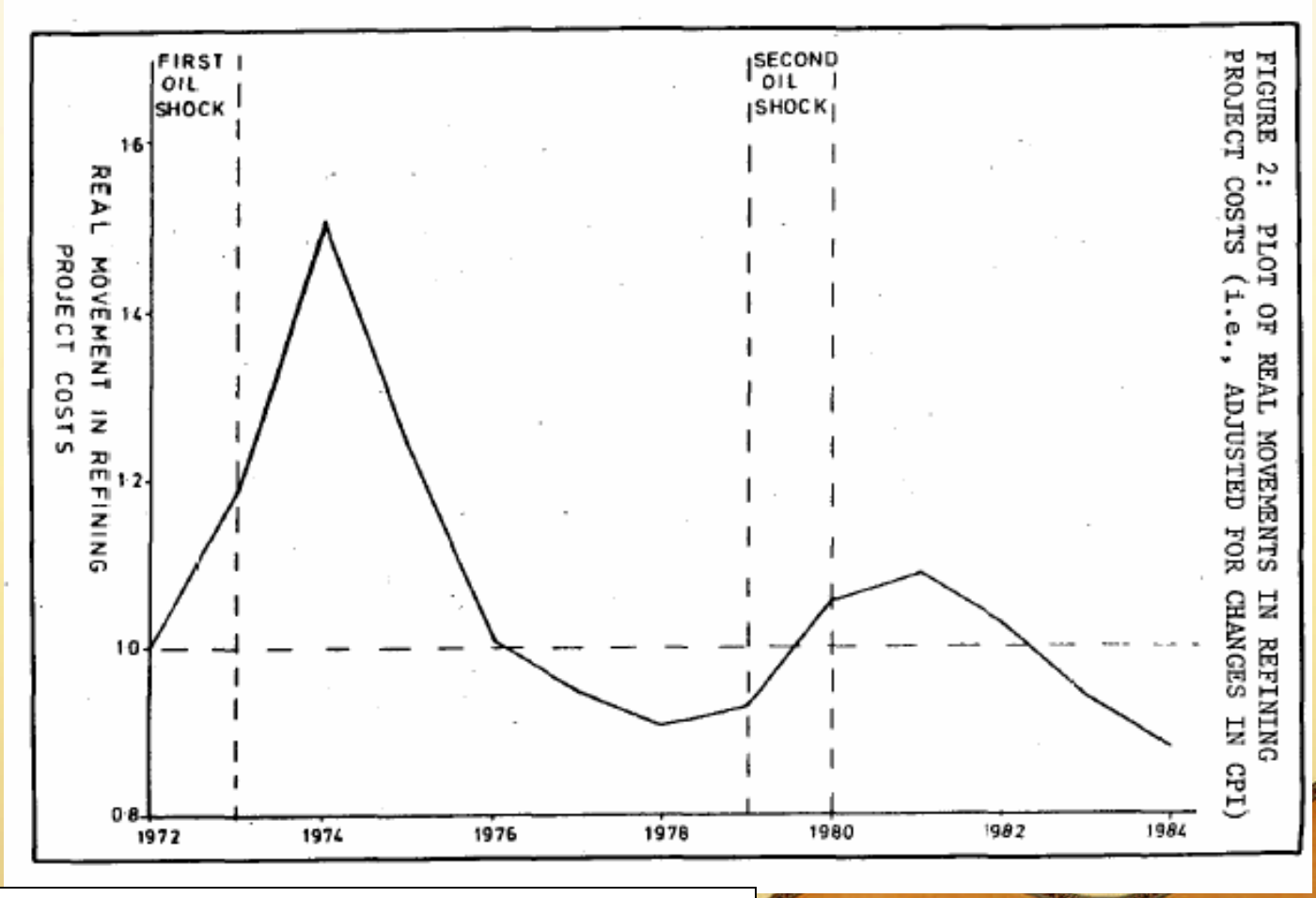
- Most sources [e.g., US Bureau of Labor Statistics (BLS)] track *compensation*, not the prices contractors charge
  - For example, The Chemical Engineering Plant Cost Index (BLS based) says construction labor increased a *total* of 3.4% and engineering only 0.7% from June 2003 to Sept 2006!
    - Clearly. these indices are not tracking the prices we pay
- Unfortunately, economists forecast the indices that the BLS tracks

The Role of Market Demand

- Contractor prices reflect their costs (e.g., compensation), but also their markups to cover risks (they are having their own labor shortage and cost growth issues) and profit
- As capex increased along with commodity prices, EPC became a seller's market, particularly for mega-projects in more remote regions

This Has Happened Before

Example From Last Volatile Period (pre-1986)



From: "Cost Estimating-Dealing With Uncertainty", Wright, P.A., and T.V. Hill, AACE Transactions", 1986

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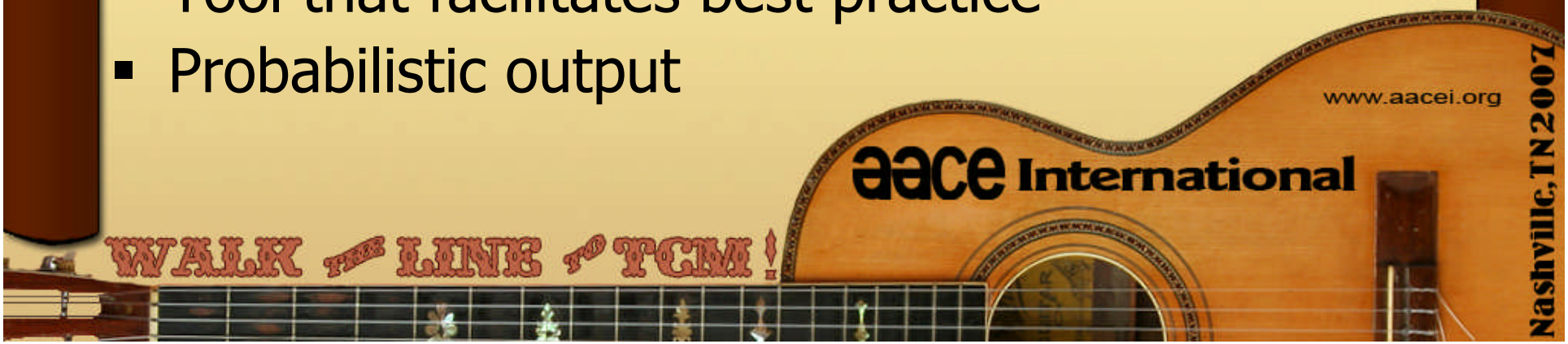
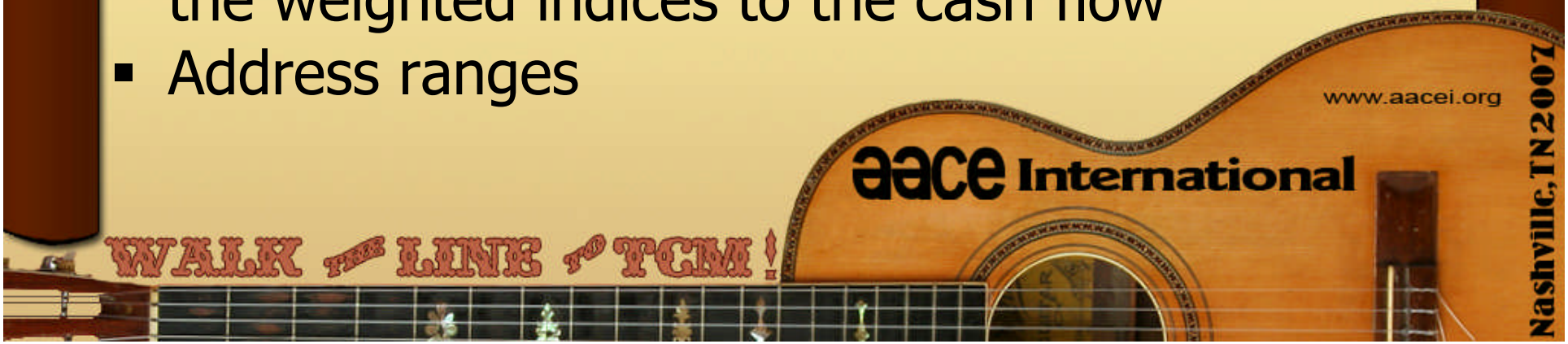
What Would A Best Practice Include?

- Differentiates between escalation & contingency
- Uses indices that address…
  - …differential price trends between accounts
  - …levels of detail for various estimate classes
- Leverages economist's knowledge
  - forecasts based on macroeconomics
- Adjusts indices for market demand
  - consistent approach, calibrated with project data
- Tool that facilitates best practice
- Probabilistic output



Basic Steps For Creating A Tool

- Decide on fit-for-use WBS/cost account breakdown
- Identify source for and acquire index forecasts
- Build weighted, composite indices that match WBS/cost accounts
- Develop algorithms to adjust indices for capital demand trends
- Develop a cash flow model by account
- Incorporate algorithms that look-up and apply the weighted indices to the cash flow
- Address ranges



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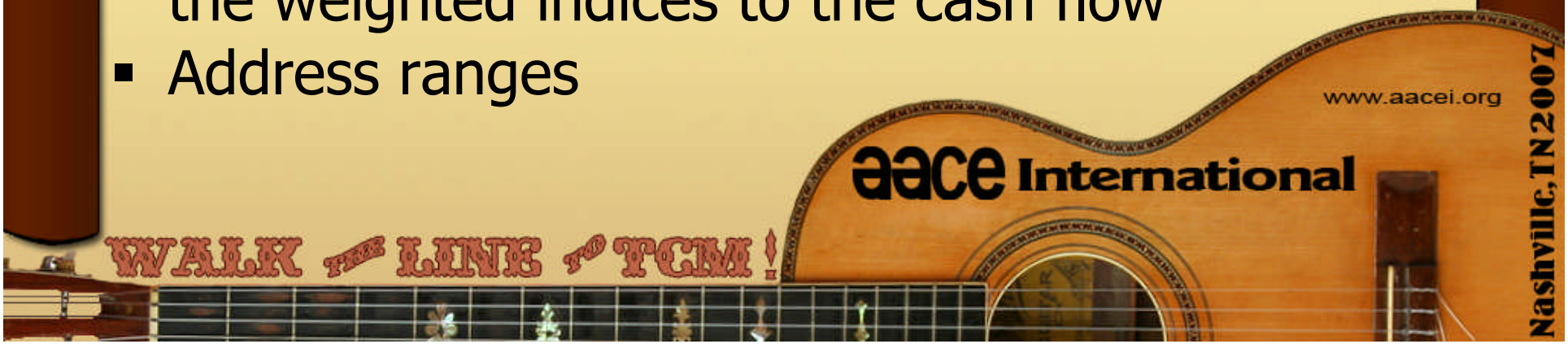
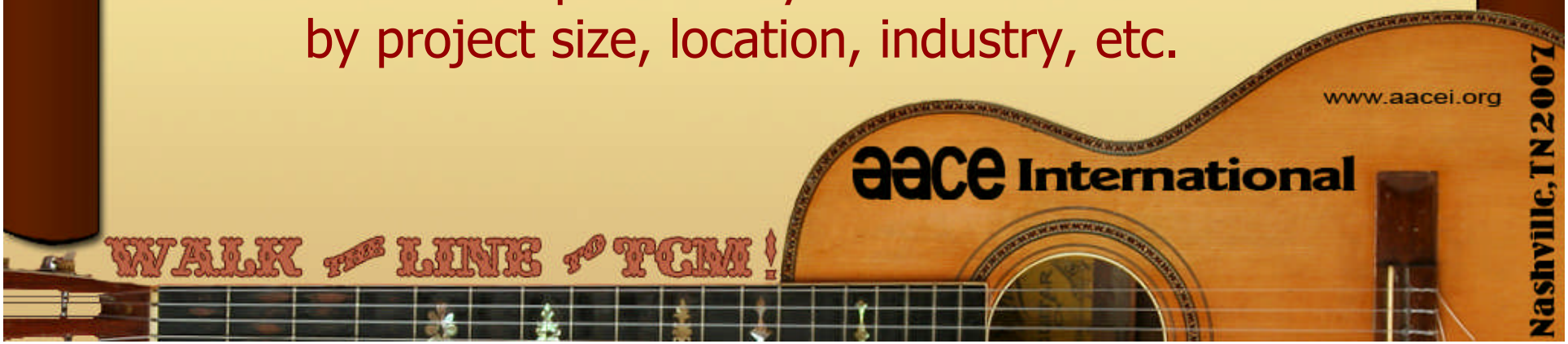


Selecting WBS/Cost Accounts

- Some Issues to consider
  - ➢Consistency with your standard WBS/COA
  - ➢Level of detail; don't go overboard
    - Accounts for which price trends are likely to differ
    - Accounts for which most estimates of any Class will likely have the detail (or detail can be forced)
  - ➢The more summarized the account, the more composite indices you will need to build
    - Will users be able to modify composite weightings?

Addressing Capital Demand

- Some Issues to consider
  - ➢Obtaining forecasts of capex
    - May use similar proxy (e.g., oil price for offshore drill rig and barge day rates)
  - ➢EPC prices lag capex trends a bit
  - ➢EPC price trends not directly proportional to capex trends
    - Relationship varies by market situation as defined by project size, location, industry, etc.

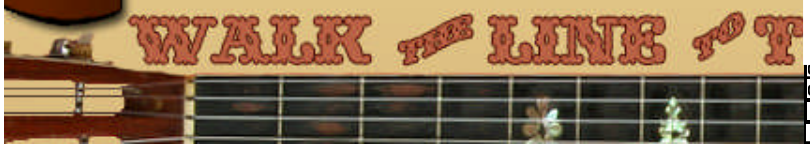


Addressing Escalation Risks

- Indices are point estimates (i.e., 50% confidence)
- Estimators will be asked to provide estimate ranges (e.g., 90% confidence)
- Several methods to address ranges:
  - Have economists prepare alternate forecasts
  - Develop algorithm to address typical range of index forecasts

Example of an escalation estimating tool user input (yellow cells) and escalation output worksheet.

A complete toolset might include the index database, a factors/weighting worksheet, a normalization tool, graphical output, and so on.



FUTURE CASH FLOW AND ESCALATION PROJECTION WORKSHEET

Project Title:	**enter title**
Case Description:	enter description
Date:	January 19, 2007

Last year indices updated: 2006 — Currency Used: $US — Project Location: SE US

1) ENTER the Nominal Estimated Costs and Planned Start and End Dates of Expenditure

Account	Nominal Costs	Dates of Planned Expenditure				Number Months
		Start		End		
		Month	Year	Month	Year	
Engineering	$ 10,000,000	1	2006	12	2008	36
	$ 10,000,000	1	2007	12	2009	36
	$ 10,000,000	1	2008	12	2010	36
	$ 10,000,000	1	2009	12	2011	36
	$ 10,000,000	1	2010	12	2012	36
	$ 10,000,000	1	2008	12	2012	60
Contingency	$ 10,000,000					
Total Project	**$ 70,000,000**	1	2006	12	2012	84
Demand Factor:	*0.26*					

2) REVIEW the Recent Historical Escalation Profile (% change in price indices from one year to the next)

SE US	From:>	1996	1997	1998	1999	2000	2001	2002
Account	To:>	1997	1998	1999	2000	2001	2002	2003
		5.2%	0.0%	(0.8%)	9.2%	7.6%	(3.5%)	5.1%
		4.4%	0.8%	(2.5%)	3.4%	(0.8%)	2.5%	4.9%
		6.1%	(0.8%)	(2.5%)	13.7%	4.5%	(1.4%)	5.8%
		1.7%	0.9%	1.7%	0.0%	0.8%	0.8%	0.8%
		2.9%	1.9%	0.0%	4.5%	2.6%	0.8%	1.7%
General Construction		4.4%	(0.8%)	(1.7%)	10.4%	3.9%	(1.5%)	4.6%

3) Enter the Percent (i.e., Risk Allowance) to Add to the Base Case Future Escalation Profile: 50%

4) ENTER the Future Escalation Profile (i.e., to override the default tool forecasts, enter the % expected change in prices from one year to

	From:>	2006	2007	2008	2009	2010	2011	2012
Account	To:>	2007	2008	2009	2010	2011	2012	2013
		4.2%	0.8%	4.9%	3.2%	2.3%	4.6%	5.9%
		0.8%	(0.3%)	1.5%	2.3%	3.0%	5.2%	4.3%
		14.8%	0.0%	1.5%	4.4%	5.7%	2.1%	2.0%
		4.3%	0.0%	0.0%	(0.3%)	1.1%	1.0%	2.1%
		10.2%	0.9%	0.9%	3.4%	3.4%	3.3%	1.6%
		13.3%	0.0%	1.6%	3.2%	3.9%	1.5%	2.3%
Contingency		7.9%	0.2%	1.7%	2.7%	3.2%	3.0%	3.0%

5) PICK the Expected Spending Profile for Each Account and REVIEW the Resulting Cash Flow (Plotted on a cum % basis below)

Account	Pick Profiles	2006	2007	2008	2009	2010	2011	2012
	2-early	2,402,469	6,060,740	1,536,791	-	-	-	-
	2-early	-	2,402,469	6,060,740	1,536,791	-	-	-
	2-early	-	-	2,402,469	6,060,740	1,536,791	-	-
	2-early	-	-	-	2,402,469	6,060,740	1,536,791	-
	2-early	-	-	-	-	2,402,469	6,060,740	1,536,791
General Construction	*2-early*	-	-	833,518	2,766,898	3,951,986	1,950,204	497,394
Contingency	*pro-rated*	400,412	1,410,535	1,805,586	2,127,816	2,325,331	1,591,289	339,031
Total Nominal Cost	**70,000,000**	2,802,881	9,873,744	12,639,104	14,894,714	16,277,317	11,139,024	2,373,216
% of Total by Year	100%	4.0%	14.1%	18.1%	21.3%	23.3%	15.9%	3.4%

6) REVIEW the Resulting Escalation

Account	Totals	2006	2007	2008	2009	2010	2011	2012
	335,132	-	256,811	78,321	-	-	-	-
	81,575	-	18,576	31,201	31,799	-	-	-
	1,684,889	-	-	354,463	998,013	332,414	-	-
	420,818	-	-	-	103,704	239,509	77,606	-
	1,949,846	-	-	-	-	383,003	1,201,746	365,098
General Construction	**1,862,757**	-	-	110,971	419,493	745,976	459,633	126,684
Contingency	**1,111,593**	-	111,855	147,843	214,319	303,359	265,893	68,325
Total Escalation	**7,446,612**	-	387,242	722,799	1,767,327	2,004,260	2,004,877	560,107
As % of Nominal Cost	**10.6%**							

Conclusions

- Reviewed escalation estimating basics
- Identified challenges for estimators (and economists)
- Identified some best practices
- Identified how best practices may be incorporated in an estimating tool that leverages economist's index forecasts

Questions?

- Contact
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    - www.validest.com
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