

A Case Study in EAC Growth

What Did We Know and When Did We Know It?

A Roman à Clef

Richard L. Coleman

Presented at SCEA

June 2010

Abstract

The responsibility for the reporting of EACs is well established, and the methods for prediction, as well as the shortcomings in those methods are well known. This should result in good EACs and a good sense of the risk in those EACs. Occasionally, however, growth of apparently totally unexpected scope occurs. Why does this happen, with all of our experience and all of our processes? This paper will describe the growth of an EAC from the original prediction through several snapshots of what was known and what was reported. The motivations for the difference between what was known and what was reported will be discussed with a view towards understanding why these apparent surprises happen. Behavior at several levels inside the organization will be discussed in an attempt to explain how there is sometimes what has been called “a conspiracy of hope.”

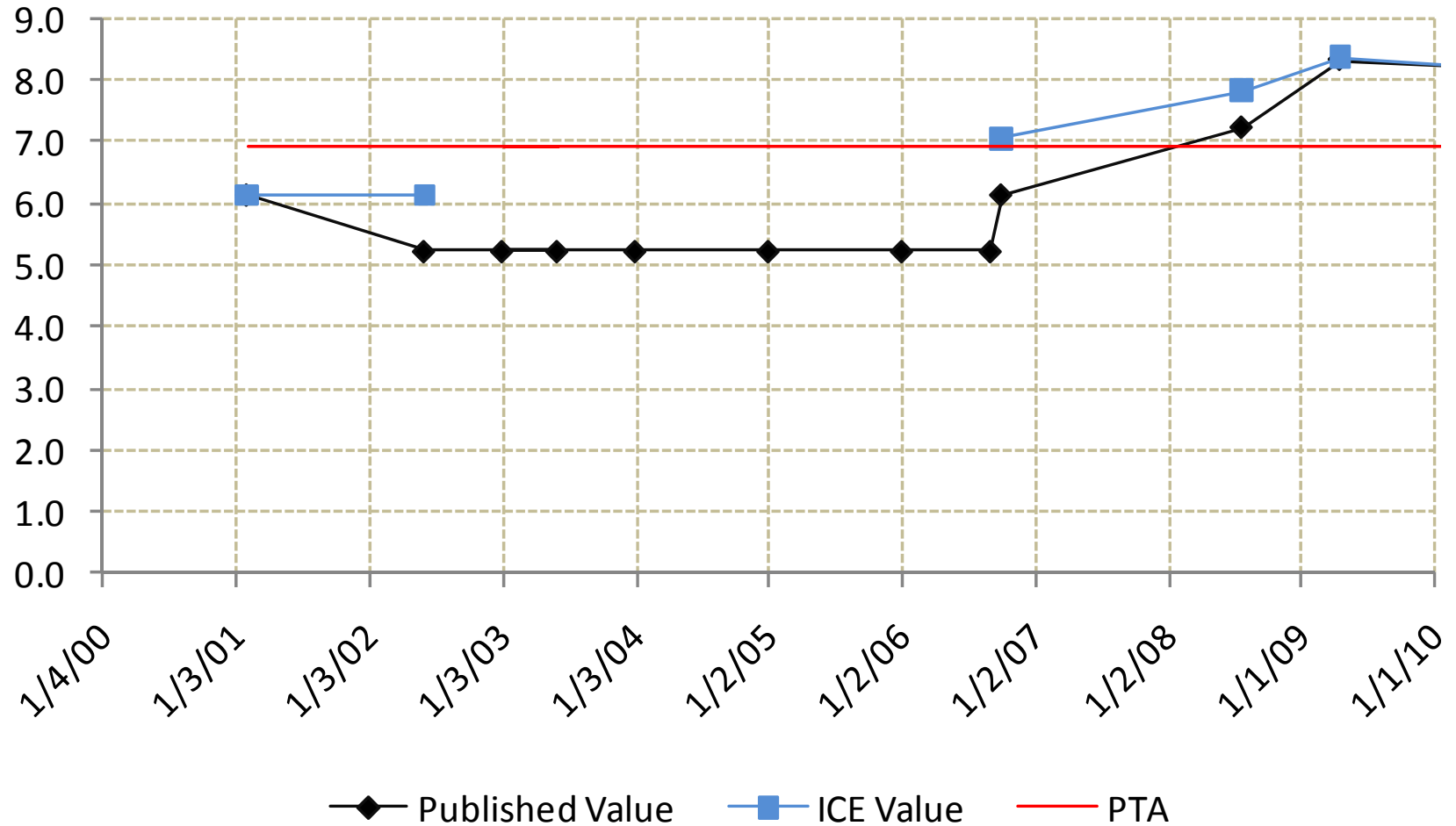
Ground Rules

- ▶ The case presented in this paper is fictional. Any resemblance to a real case is accidental and unintentional.

- ▶ All of the values in this briefing have been changed
 - Estimates at Completion (EACs) by a single factor
 - Dates by a single translation
 - Wages by a single factor different from the EAC factor

The Track of An Estimate at Completion

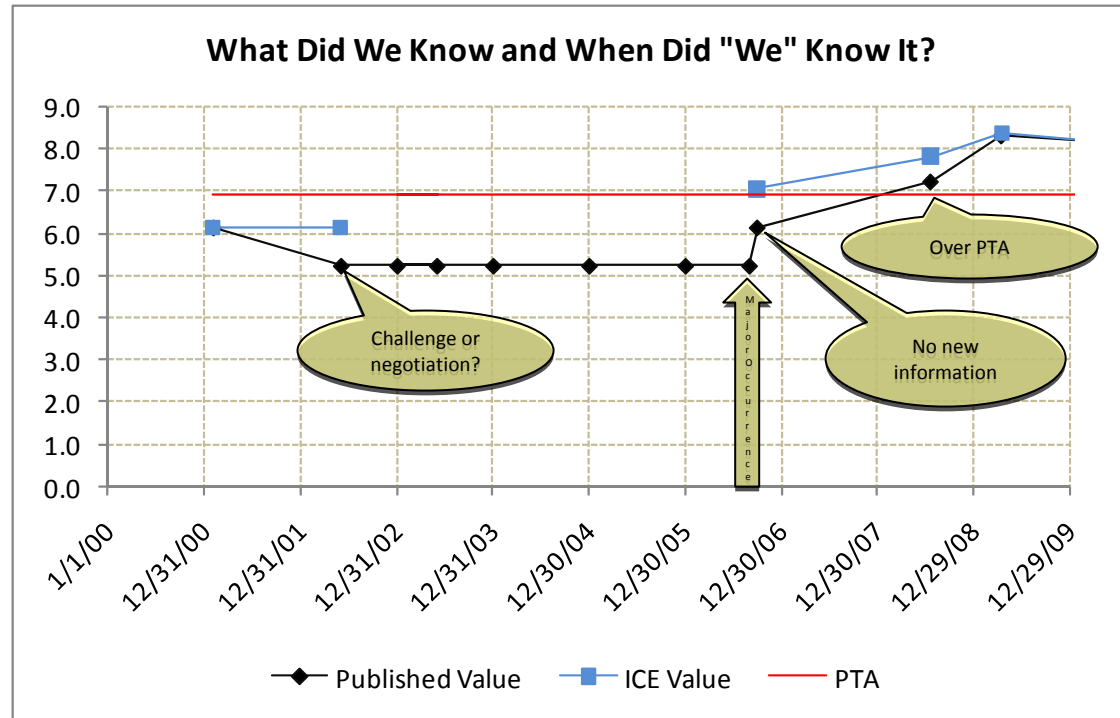
What Did We Know and When Did "We" Know It?



The Track of the EAC

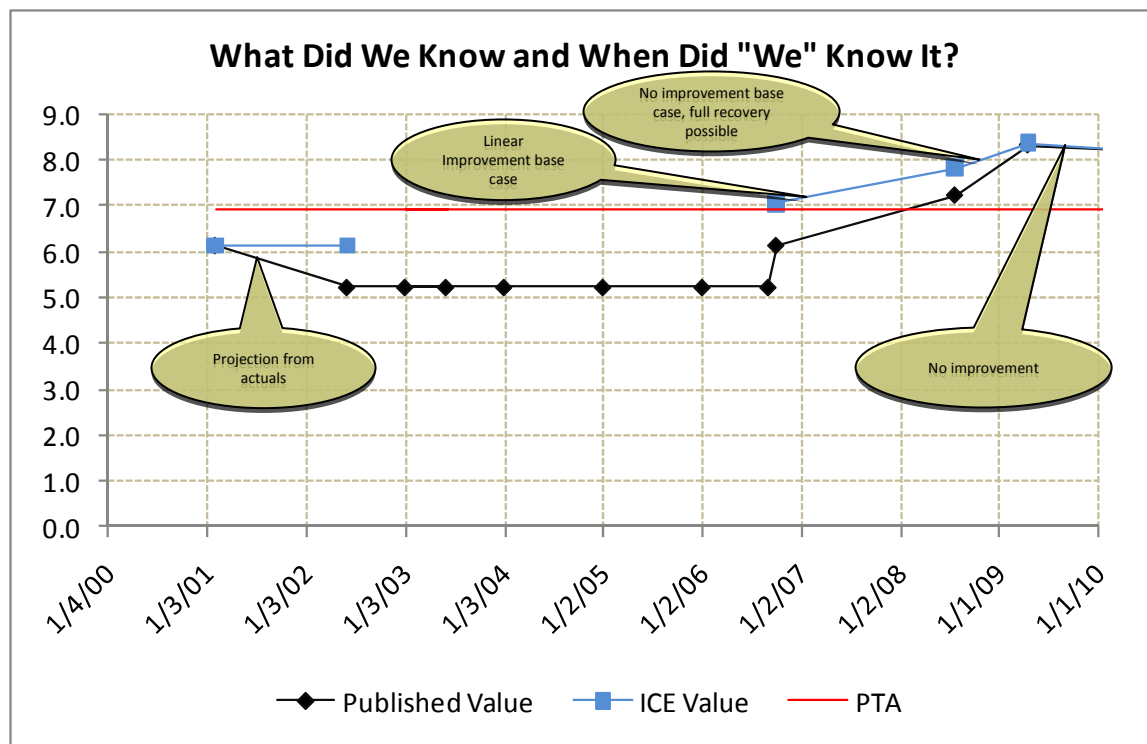
- ▶ The question of what did we know when depends on who is meant by “we” and what is meant by “know” (the when is easy!)
- ▶ The ICE Team was always at or above the published value
 - Did the ICE know something that the published value didn’t reflect?
- ▶ The Major Occurrence was not predicted, and the shift in the EAC to the previous ICE value was not “caused by” it
 - The Major Occurrence may have provided cover for the published shift, but there was no specific new basis for the published shift
 - The Major Occurrence took time to manifest and further time to model
- ▶ The lines should not be construed as showing trends and are only included as aids to understanding
 - ICE values were determined only when shown. It is not clear what exactly would have been estimated in between looks.
 - EACs are shown notionally between 2002 and 2006 (as best they are known) and coincident with ICEs (at which points they are known)
- ▶ The EAC jump in mid-2008 was to just-over-the-point-of-total-assumption (PTA), which “took the customer off the case”

Event	Date	Published Value	ICE Value
Original cost estimate	31-Jan-01	6.1	6.1
Proposal	1-Jun-02	5.2	6.1
First EAC	1-Jun-03	5.2	
EAC	1-Jan-03	5.2	
EAC	1-Jan-04	5.2	
EAC	31-Dec-04	5.2	
EAC	1-Jan-06	5.2	
Major Occurrence	1-Sep-06	5.2	
First Inking	30-Sep-06	6.1	7.0
Second Inking, first confession	20-Jul-08	7.2	7.8
Third inking, second confession	15-Apr-09	8.3	8.4
Actual	1-May-10	8.2	8.2



Did the ICE know something that the published value didn't reflect?

- ▶ The ICE used projection from prior actuals plus changes to produce their original estimate
- ▶ The ICE built a predictive model in 2006 that was shown to be unbiased and to have a CV of less than 5% at the 50% completion point
- ▶ The ICE adapted the model to respond to the Major Occurrence in 2006 but the persistence of the shift caused by the Major Occurrence was unknown, so the ICE assumed linear improvement
- ▶ The ICE determined in 2008 that the linear improvement was not coming to pass, so steady state with a chance for improvement was assumed
- ▶ The ICE determined in 2009 that there was no likelihood for any improvement, so the improvement scenario was taken out



What's the Motivation?

- ▶ Cost estimators occasionally wonder “what’s in it for them [program management and leadership] to deny an EAC rise?”
 - Why should they deny it if it’s going to happen?
 - Wouldn’t it be better to come clean?
 - Isn’t serial disclosure going to ultimately erode customer confidence?
 - Is it worth the risk of discovery if it becomes known that we knew?
- ▶ The ICE team in this case study kept asking themselves these questions
- ▶ The ICE Team, of course, didn’t see the whole game board
 - Or were too daggone busy to tumble to it
 - Or were too naive

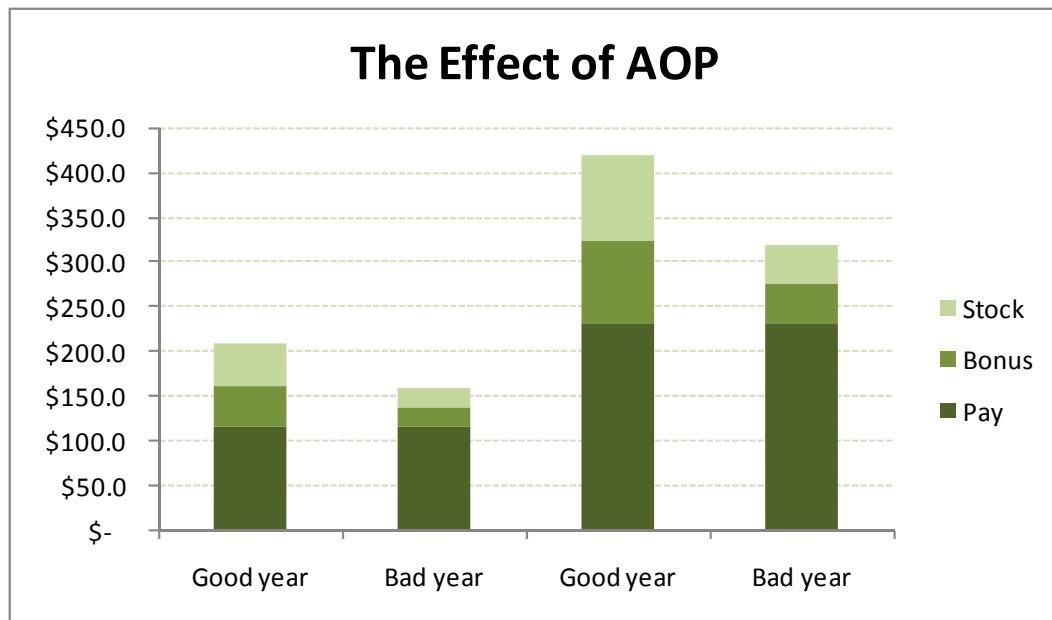
What's the Motivation?

- ▶ The below tables shows the difference between a “good year” and a “bad year”
 - Values assume a regular year vs. a year in which a major write-off has occurred
 - Bonuses are cash, stocks take a few years to vest, both have multipliers that take the performance of the organization into account
 - Drop if Retained assumes multipliers drop and the stock price drops
 - The Forfeiture if Fired shows what happens to either person if they are not yet retirement eligible and the news is so bad that they get sent packing
 - The values are conservative

- ▶ Here are the key points:
 - *The year is defined by the Annual Operating plan (AOP)*
 - *The AOP is the sum of the EACs*

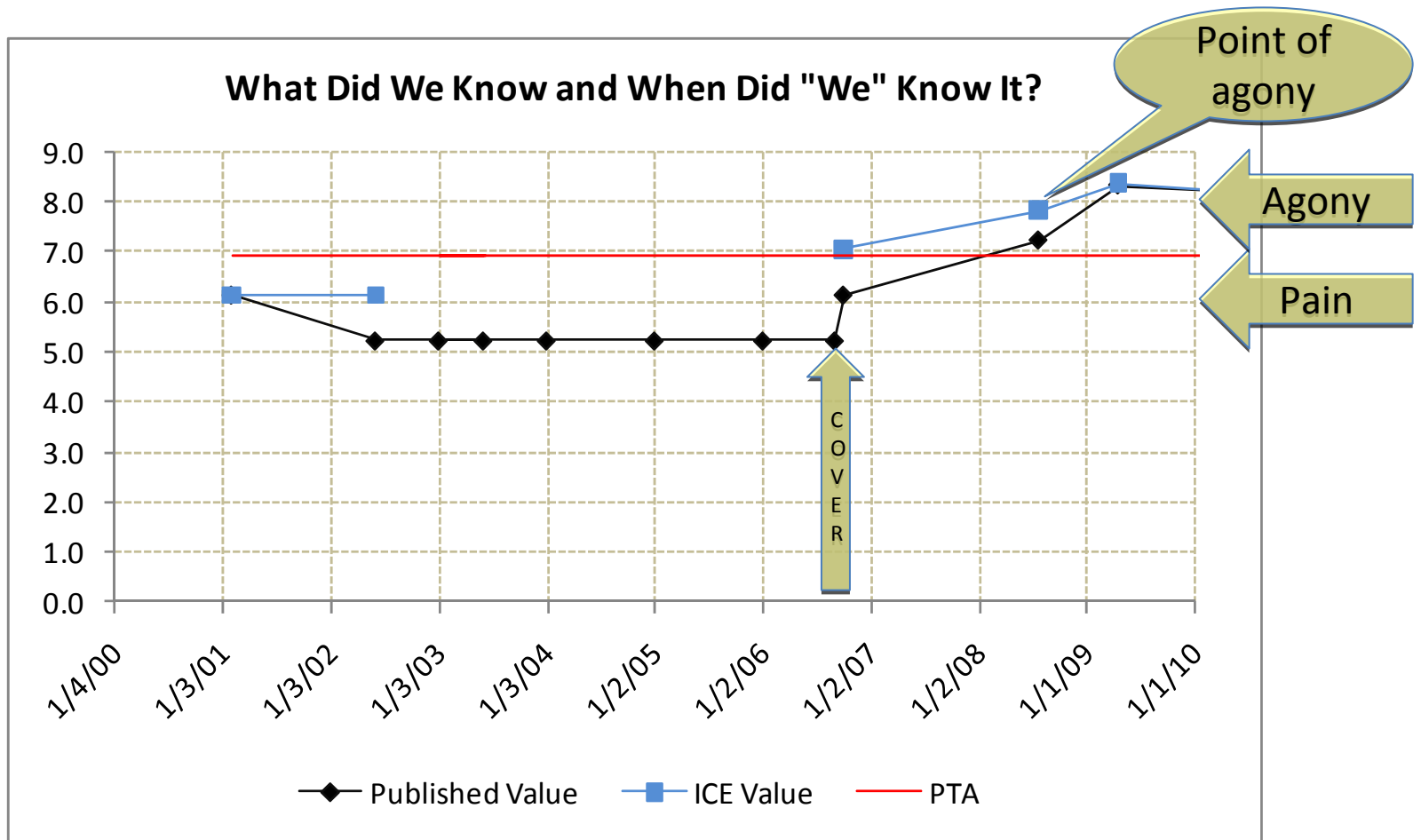
- ▶ So, every year you can maintain the AOP by maintaining the EACs, you avoid the drop or the loss, whichever you think pertains to you

Level:	Upper Management		Executive	
Source (\$K)	Good year	Bad year	Good year	Bad year
Stocks	\$ 47.9	\$ 21.5	\$ 95.7	\$ 43.1
Bonus	\$ 46.2	\$ 23.1	\$ 92.3	\$ 46.2
Pay	\$ 115.4	\$ 115.4	\$ 230.8	\$ 230.8
Total Comp	\$ 209.4	\$ 160.0	\$ 418.8	\$ 320.0
Drop if Retained		24%		24%
Forfeiture if Fired		\$ 122.0		\$ 244.1
Forfeiture/Annual		58%		58%



The Cost Made Concrete

- ▶ The program was big enough to make impact on the organization's AOP when the EAC jumped in 2005, but probably not enough to make the tabled losses happen
- ▶ The program was big enough to make the tabled impact, or more, if the ICE value in mid 2008



What's the Motivation, Part 2



« *Le cheval peut apprendre
à parler!* »



Louis XV was out for a ride in full regalia with Jeanne-Antoinette Poisson, Marquise de Pompadour. He was thrown from his horse. Outraged and embarrassed, his Gallic pride deeply hurt, dusting himself off, he ordered the Crown Equerry brought before him. He ordered him executed immediately. The Crown Equerry blanched and his knees buckled, but recovering quickly, he cried out,

“Your Majesty, by your leave, if you spare me but briefly, I will make you the talk of the crowned heads of Europe, indeed, the most renowned King of all time.”

“And, how will you do this?” asked Louis, intrigued.

“Your Most Serene Majesty, I will teach your horse, this very horse, to speak perfect French. If I can do this in six months, spare me, if I fail, execute me.”

“What have I to lose? You have six months but not a day more.” said Louis, majestically and decisively, warmed by Jeanne-Antoinette’s admiring gaze.

“Are you mad?” asked the guards as they dragged the Equerry away, “You cannot do this, no one can do this!”

“Perhaps,” said the Equerry, “perhaps I cannot, but in six months, much can happen, *Louis* may die ... I may die or ... the horse may speak!”

How Did They Sell That?

- ▶ “There In other words is a wide variation in the numbers, so management had to make a call”
 - We chose between a biased number and an unbiased number
 - Um, but we chose the biased one
- ▶ “The ICE is just another point of view”
- ▶ “The ICE Team doesn’t have the in-depth knowledge of the Program Team”
 - “There are over 1000 years of experience in this room”
- ▶ “[The ICE Team] will want to debate with me from a purely statistical point of view, but I am 85% confident that this EAC is correct”
- ▶ “We’ve had experienced teams kicking the tires and they tell us that things are improving”
- ▶ “The ICE’s model is flawed”
- ▶ “Our data base is no longer [working, reliable], so neither we nor the ICE can make sense of it, so the ICE’s analysis, although perhaps otherwise worthwhile, is based upon invalid data”
- ▶ Remove the S-curve because S-curves are just too compelling
- ▶ Don’t forward the ICE analysis and/or don’t let the ICE brief their results in person
- ▶ Don’t invite the ICE team to EAC reviews
- ▶ Marginalize and harass the ICE Team
- ▶ Prohibit note taking in key decision meetings
- ▶ “Internal ICEs are what-if analysis”

What About the Customer?

- ▶ The customer is often suspicious but occasionally has a “not on my watch” motivation
- ▶ The customer has less data and less experience
- ▶ The customer relies on the share line to enforce discipline
- ▶ Once PTA is reached, the customer no longer has a dog in the fight and so relaxes their vigilance, such as it was

So, What Should I Do?

Choice 1: Don't do ICEs

Choice 2: Cooperate and equivocate

Choice 3: Make a stand and brace yourself



Choice 3