

# Improving Early Estimates

CII Research Team 131

Northwest Construction Consumer Council

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## CII Team Members

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Mark Chen	Weyerhaeuser
Ronald Clevenger	TVA
David Pendleton	Sverdrup
Garry Oberlender	Oklahoma State University
Philip Pullukat	GM
Joe Smith	Union Carbide
Karl Sturm	Texaco
Joe Terrezza	Foster Wheeler
Steve Trost	Oklahoma State University

## **Additional Members**

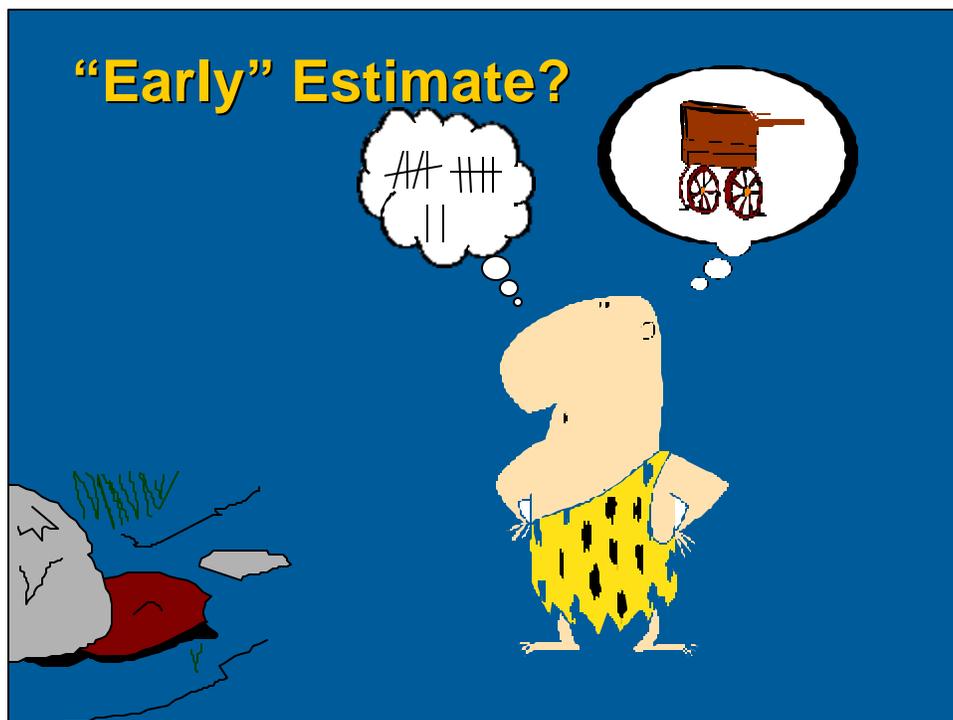
Rusty Allen	Union Carbide
Bob Cole	U.S. Department of State
Mitch Elwood	Enron
Guy Futrell	Bechtel
Bob Geile	Solutia
John Gentile	GM
Bruce Manson	Graycor
Patrick Sweeney	Enron
Craig Ward	TPA

## **“Improving Early Estimates” CII Products**

<b>IR131-1</b>	Estimate Score Program (ESP)
<b>IR131-3</b>	ESP User’s Guide
<b>RS131-1</b>	Research Summary
<b>RR131-11</b>	Research Report
<b>IR131-2</b>	Best Practices Guide
<b>IR131-4</b>	CD with all of the above

## Improving Early Estimates

- Perspective on the issue
- Research approach
- Blend of early estimate influences
- Application of findings
- Tool for improving early estimates
- Implementation Session overview



## **Early Estimates — Basis for Business Unit Decisions**

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- Asset development strategy
- Screening of potential projects
- Commitment of resources
- Impact of poor estimates
  - Lost opportunities
  - Wasted development effort (dead ends)
  - Lower than expected returns

## **Common Characteristics of Early Estimates**

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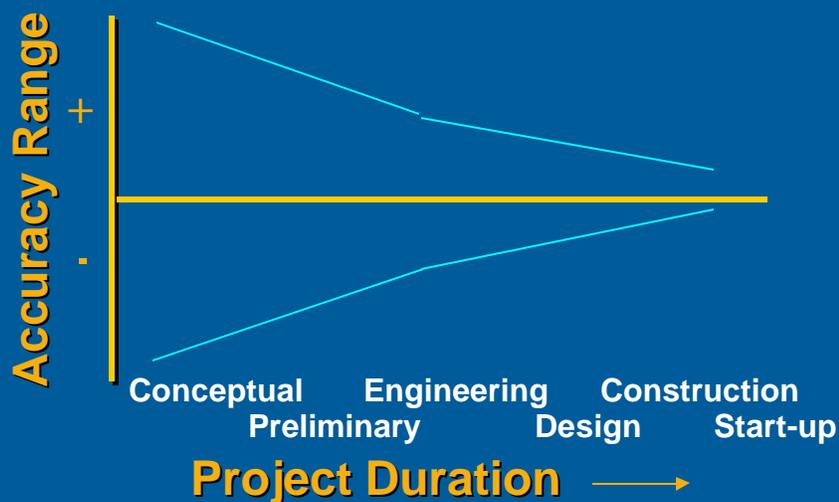
- Basis for business **decisions**
- Based on limited **scope definition**
- High potential for **scope change**
- Results often **“cast in stone”**
- Early in a **series** of estimates

## Definition of “Early Estimate” ?

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- Initial “back of the envelope” ?
- Preliminary / conceptual?
- Full funding?
- Specified accuracy range?

## Estimate Accuracy Over Life of Project



## **CII Cost Estimate Definitions (CII SD-6)**

<u>Estimate Class</u>	<u>Accuracy (%)</u>	<u>Description</u>
Order-of-magnitude*	± 30 to 50	Feasibility study - cost curves
Factored estimate*	± 25 to 30	Major equipment - factored
Control estimate	± 10 to 15	Quantity based
Detailed or definitive	< 10	Based on detailed drawings

\* Considered to be “early estimates”

## **AACE International Cost Estimation Classifications (18R-97)**

<u>Estimate Class</u>	<u>Accuracy (%)</u>	<u>Description</u>
Class 5 *	-50 to +100	Concept screening
Class 4 *	-30 to +50	Study or feasibility
Class 3 *	-20 to +30	Budget, authorization, or control
Class 2	-15 to +20	Control or bid / tender
Class 1	-10 to +15	Check estimate or bid / tender

\* Considered to be “early estimates”

## **Research Basis**

**Early Estimate** — Any estimate prior to and including the full funding estimate, but not based on detailed design.

## **What Does “Improving Early Estimates” Mean?**

- **Better business unit decision making**
  - Providing better information.
  - Improving alignment between business units and project teams.
  - Facilitating better understanding and communication of the estimate.

## What Does “Improving Early Estimates” Mean?

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- **Better quality of early estimates**
  - Reducing subjectivity by quantitative measurement of estimates
  - Improving accuracy
- **Utilization of estimate correlations**
  - Estimate drivers
  - Accuracy
  - Risk and contingency

## How Can Early Estimates Be Improved?

Fire the Estimator?



## How Can Early Estimates Be Improved?

Estimate “harder”?



## How Can Early Estimates Be Improved?

Ask the vice president?



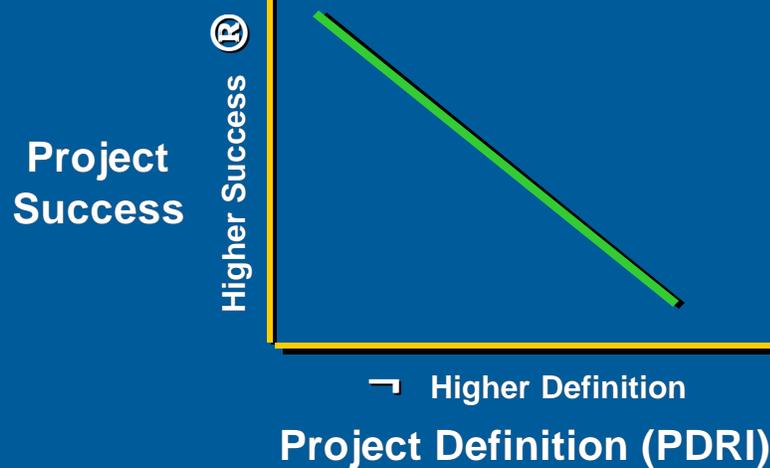
## How Can Early Estimates Be Improved?

Make a later estimate?



## Project Definition Rating Index

CII Product IR113-2



## Early Estimate Influences

**Given:** Better scope definition gives better estimates.

**Enter:** Cost estimating and ?

## Crossroads

A. Focus on pure cost estimating?



OR

B. Incorporate other real world factors that affect estimate results?

## **Decision**

### **B. Incorporate other real world factors that affect estimate results.**

- Consistent with project definition relationship to project success
- “No excuses” solution
- Incorporates PDRI (scope definition) into improving early estimates

## **How to Improve Early Estimates?**

- Estimating work process
- Alignment / communication
- Human factors
- Estimating tools and techniques
- Components of estimates
- Scope definition

## **45 Estimate Drivers Identified in Four Divisions**

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- **Who** is involved in the estimate?
- **How** is the estimate prepared?
- **What** is known (scope definition)?
- **Other factors** affecting the estimate.

## **Estimate Scoring**

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- Estimate Score Sheet  
(45 elements)
- Elements rated from 1 to 5
- Weightings established from  
sampling of 72 data points

## **Research Results — Estimate Influence by Division**

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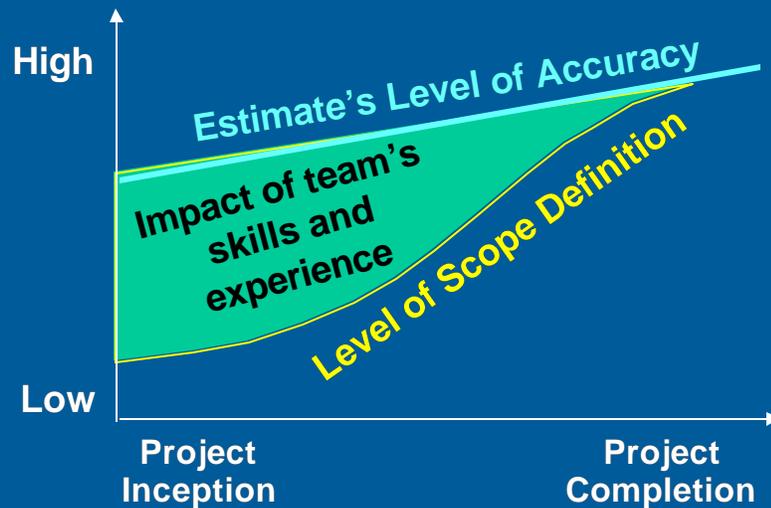
<b><u>Division</u></b>	<b><u>Relative Influence</u></b>
Who Involved	Medium
How Prepared	Medium
What Known (scope)	High
Other Factors	Medium

## **Research Results — Estimate Accuracy Driver Groupings**

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<b><u>Grouping</u></b>	<b><u>Relative Weight</u></b>
Basic design	Strongest
Cost info./experience	Strong
Time to prepare estimate	Strong
Site information	Strong
Market issues	Strong
Alignment/involvement	Moderate
Owners costs	Moderate

## Relative Impact of Team's Skills and Experience on Early Estimates



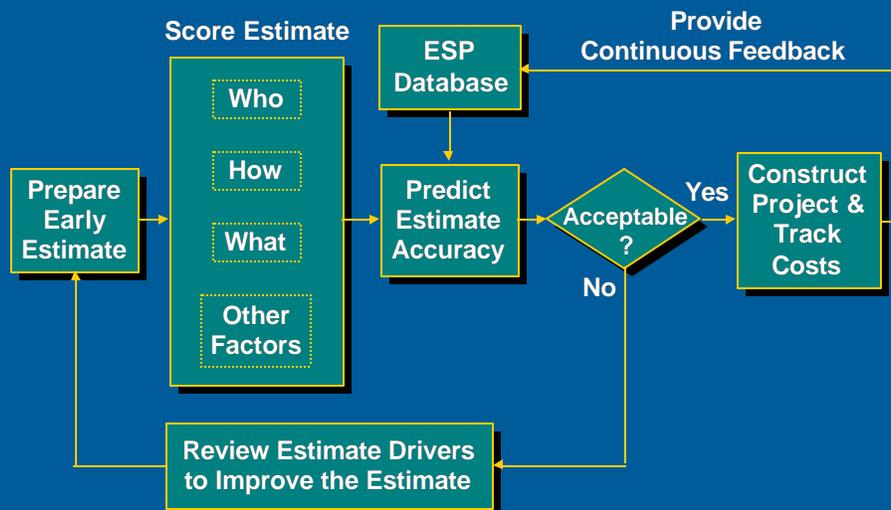
## Research Accomplishments

- Estimate Score procedure
  - Measure estimate quality.
  - Correlate estimates with their final cost.
  - Identify estimating improvement areas.
- Estimate Score computer model
  - Predict accuracy from estimate score.
- Best Practices Guide
  - Alignment, process, procedures

## Estimate Score Program (ESP)

- Calculates score for a given estimate
- Provides estimate database
  - Early estimates versus actual final cost.
  - Estimate scores correlated to predicted accuracy.
  - Initially populated with CII Team 131 data.
  - Set up to accept company-specific data.
- Recommends contingency based on risk level.
- Highlights strengths and weaknesses to facilitate estimate improvement.

## Improving Early Estimates with ESP



## **Summary**

- **Early estimates are:**
  - basis for business decisions.
  - driven by team issues as well as scope definition and cost estimating.
  - measurable.
- **Early estimate improvement is short term and long term.**
- **Learn to use ESP in Implementation Session.**