



**TRUE PROGRAM
SUCCESS**

'05

PRICE Systems' US Symposium
Grand Hyatt Tampa Bay
Tampa Bay, Florida
March 23-25, 2005

"The Way-Ahead: Improving the Army's Software Cost Estimating"

Presented by Jim Judy
Senior ORSA Cost Analyst
Office of the Deputy Assistant Secretary of
the Army for Cost & Economics

PRICE



Our Goal

ODASA
Cost &
Economics

- **To Develop Reasonable & Realistic Software Cost Estimates to Insure Army Programs have the Appropriate Cost, Staffing & Schedule to Succeed.**
- **To Develop a Methodology on How to Prepare Fully-Supported SW Development Cost Estimates that**
 - **Give Confidence to the Army Leadership & the Office of the Secretary of Defense that our Software Estimates are “Reasonable & Realistic”**
 - **Address OSD CAIG Concerns**
 - **Don’t trust Parametric Models**
 - **Always want to see Actuals**



Ever Growing Concerns

ODASA
Cost &
Economics

- **Most Major Army Programs can be considered “Software Intensive” with Estimates of Several Million Source Lines of Code (SLOC)**
- **Limited Actual Data Available**
 - **Future Promising with Software Resources Data Reports (SRDR)**
 - **Current Void of Software Data**
- **Range of Software Cost Estimates**
 - **Program Office Estimates are often Low**
 - **Reflect Contractor Proposals**
 - **Tied to an Existing Budget or Schedule**
 - **OSD CAIG Estimates are often Conservative and Higher**



Ever Growing Concerns (cont'd)

- **Reoccurring Software Concerns**
 - **Software Sizing**
 - How reasonable are the SLOC estimates?
 - Has an alternate method been used to verify the SLOC Counts?
 - **SLOC Counts**
 - New, Modified, Reused & COTS
 - Calculating ESLOC
 - Effort Required to Reuse Pre-Existing SLOC
 - **SLOC Growth**
 - 22% vs 30% vs 40% vs 43% vs 250%
 - Thru a particular SW Development Activity/Phase
 - **SW Productivity**
 - No Historical Data
 - Don Reifer's, "Let the Numbers Do the Talking" and recent Aerospace Corp Study are available, but only as a "Cross-Check"
 - Rates from Parametric Models need Justification
 - Contractor Provided Rates are not Defendable w/o Actuals



Ever Growing Concerns (cont'd)

ODASA
Cost &
Economics

- **COTS**
 - Integration Effort/Glue Code
 - Maintenance Concerns; Not Just the Licensing Fees
- **Schedule Concerns**
- **Actuals/Historical Data**
 - Prior Development
 - Analogies
 - Contractor Past Performance
 - “Tell the Story”
 - Analogies
- **Integration**
 - SW-SW
 - SW-HW
 - Systems
 - System of Systems



Way-Ahead

- ✓ **Create a Software Team Dedicated to Improving Software Cost Estimating**
 - **Develop a Fully-Supported, Multi-Dimensional, Software Cost Estimate Methodology to:**
 - **Challenge the Software Sizing**
 - **Make Better Use of Parametric Models & CERs***
 - **Use Actuals to Support the Estimate***
 - **Prepare/Defend Our Estimates for Reoccurring Software Concerns**
 - **Develop a Software Database***
 - **Collect Software Data on Legacy Army Programs**
 - **Tools to Help Our Analysts**
 - **Handbook**
 - **Quick Cost, Staffing, Schedule Looks**
 - **Rules of Thumb**
 - **Training**

*** To be discussed in further detail**



Better Use of Parametric Models

- **Parametric Models are very accurate if calibrated**
 - Calibration requires data
 - Army currently lacks data
 - Contractors are required to submit SRDRs after a completed Software Development
 - ODASA-CE is creating a Software Database...Data Collection starts this year
- **Show/Understand Actuals/Database going into “Blackbox” or CER**
- **Run the model with Default Settings vs Adjustments (Defend any Adjustments)**
- **Show How Results are within Historical Bounds**



Need for Actuals

ODASA
Cost &
Economics

- **The Army needs to use Historical Data to help show how our SW Development Cost Estimates are “Reasonable & Realistic”**
- **Using Actuals can show how Initial Costs, Staffing & Schedules are “Reasonable & Realistic”**
- **The Historical Data is there!**
- **Actuals would support Contractor Assertions that SW Development Processes are Improving**



Actuals from Existing Programs

ODASA
Cost &
Economics

- **At the “Bare” Minimum, show SW Development Cost & Schedule Actuals for a Prior Development Effort and include:**
 - **SLOC Counts (New, Modified, Reused & COTS)**
 - **Staffing**
 - **Productivity Achieved**
 - **Total SW Development Hours/Months**
 - **Programming Language Used**
 - **Etc.**
- **Actuals must be validated by existing Cost Data Reports**



Similar Programs

ODASA
Cost &
Economics

- **At the “Bare” Minimum, show SW Development Cost & Schedule Charts for the Similar/Analogous Programs**
 - **One Chart for Costs and another for Schedules**
 - **(System Costs and Schedules should also be shown!)**
- **More thorough SW Data for each Program can and should be shown to include**
 - **SLOC Counts (New, Modified, Reused & COTS)**
 - **Staffing**
 - **Productivity Achieved**
 - **Total SW Development Hours/Months**
 - **Programming Language Used**
 - **Etc.**
- **Actuals must be validated by existing Cost Data Reports**
- **The Army knows the best Similar/Analogous Programs**



Contractor Past Performance

ODASA
Cost &
Economics

- **Contractors have likely developed Legacy or Similar/Analogous Programs**
- **For Recent Programs show**
 - **SLOC Counts (New, Modified, Reused & COTS)**
 - **Staffing**
 - **Productivity Achieved**
 - **Total SW Development Hours/Months**
 - **Programming Language Used**
 - **Etc.**
- **Actuals must be validated by existing Cost Data Reports**



"Telling the Story"

- Different from the Similar/Analogous Program View as the Focus is on the New Development, the Use of Pre-Existing Software and COTS that's being Proposed within the Current Program
- Shows how Suppliers use Legacy Systems and New Development to arrive at the Currently Proposed Solution
- Traces the Cost & Schedule of the Development of the Software that's being Reused
- Good Method to Cross-Check a Parametric or a Level of Effort Estimate
- Actuals must be validated by existing Cost Data Reports



Software Database Development

ODASA
Cost &
Economics

- **Statement of Work Released**
- **Effort Begins this Spring/Summer**
- **Data Collected will Complement Our Parametric Models**
 - **Development of CERs that Feed our Models**
 - **Rules of Thumb**
 - **Cross-Checks of Models**
- **Not Intended to Replace our Models or Support Contractors**
 - **Don't want to Develop our Own Parametric Model**
 - **Will continue to Need Contractor Support to Address New Software Development Processes & Technologies**



In Conclusion

- **In November 1994, Tom DeMarco stated:**
“Only in software do people cling to the illusion that it’s OK to come up with estimates of the future, even though you’ve never measured anything in the past”
- **Army is taking Bold Steps to Improve its Software Cost Estimating**
- **If any Assistance or Clarification is needed please contact:**
Jim Judy
Software Team Leader
ODASA-CE
703-601-4181
DSN 329-4181
James.Judy@us.army.mil