

Software Resource Data Report (SRDR)  
how it is changing NAVAIR  
software estimating

Presented to  
Software in Acquisition Workshop

By

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# Outline

- Overview of what the SRDR is
- What can we glean so far
- Issues with the data
- Data way forward
- How NAVAIR is using the data to estimate
- How to gain access to the data

# What is the SRDR

- SRDR is a required report on all ACAT I programs, and is flowed down to any sub-element with greater than \$25M in software
  - Reports are submitted at contract award and contract completion
  - Some programs submit by build, or provide annual updates
  - Typically grouped with the Contract Cost Data Report (CCDR) DID's, although no dollars are reported in the SRDR
- In place since 2004, really emphasized over last couple of years
- Program reporting plans are approved by the CAIG Chairman
- The Defense Cost and Resource Center (DCARC) administers a central repository of SRDR/CCDR data
  - They do perform a top level validation of data
  - Ensure compliance with approved reporting plans

# SRDR

- Unlike cost data reports, the data elements for software are customized for each contractor
  - Most follow the format outlined in the DD-2630 form, however this is not a required submittal
  - At times requires judgment to compare data across programs
- Cost community users are pushing for more standardization
  - Recent DOD 5000.4M changes to reporting include
    - Reporting of code counts in logical using the USC code counter
    - Reporting of the % redesign, recode and retest for modified and reused code to allow for ESLOC calculation

# SRDR Data Fields

- Program Name
- Contractor
- Event (Initial, build, final)
- Contract number
- CMM/CMMI Rating
- Primary/secondary application
- GOTS/COTS used
- Personnel experience
- Peak Staff size
- Primary and secondary language
- Internal and external requirements count

- Requirements volatility
- New, modified, reuse code counts
- Counting method – logical/physical/other
- Start Month, End Month, Hours
  - Requirements Analysis
  - Architecture
  - Coding and testing
  - System testing
  - Qualification testing
  - SW Develop T&E
- Other Hours

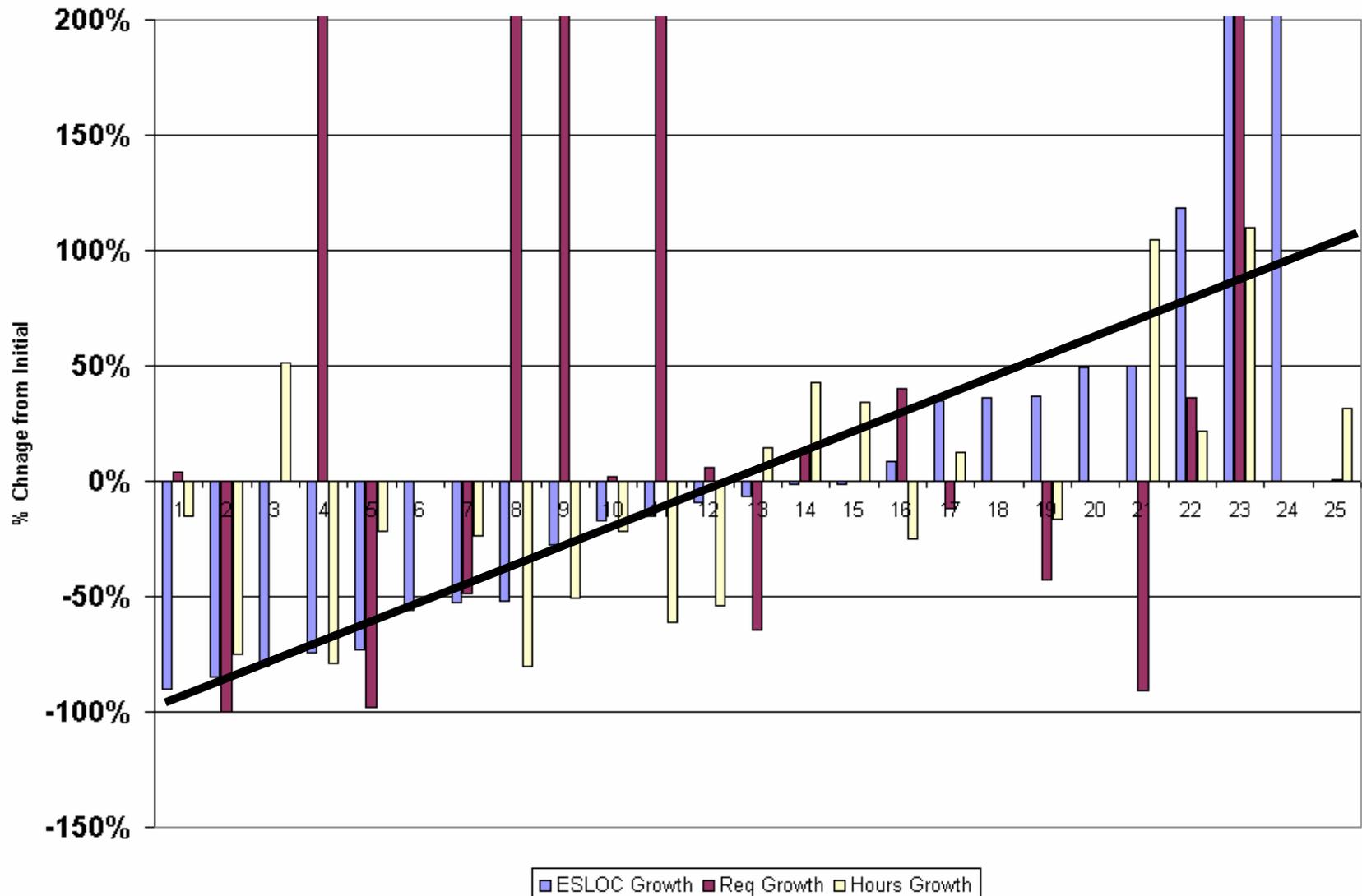
# SRDR Data Status

- NAVAIR cost department has consolidated all SRDR submits into an Excel spreadsheet
  - Spreadsheet posted in a e-room at DCARC web site
  - Users include Air Force, Army, CAIG, NSA, NRO, other DOD
- Monthly update performed
- As of August 2007:
  - 445 CSCI Records
  - 69 are completed build or program actuals
  - Majority of reports are valid for analysis
- Anticipate that within two years we will have over 1000 records and several hundred completed reports

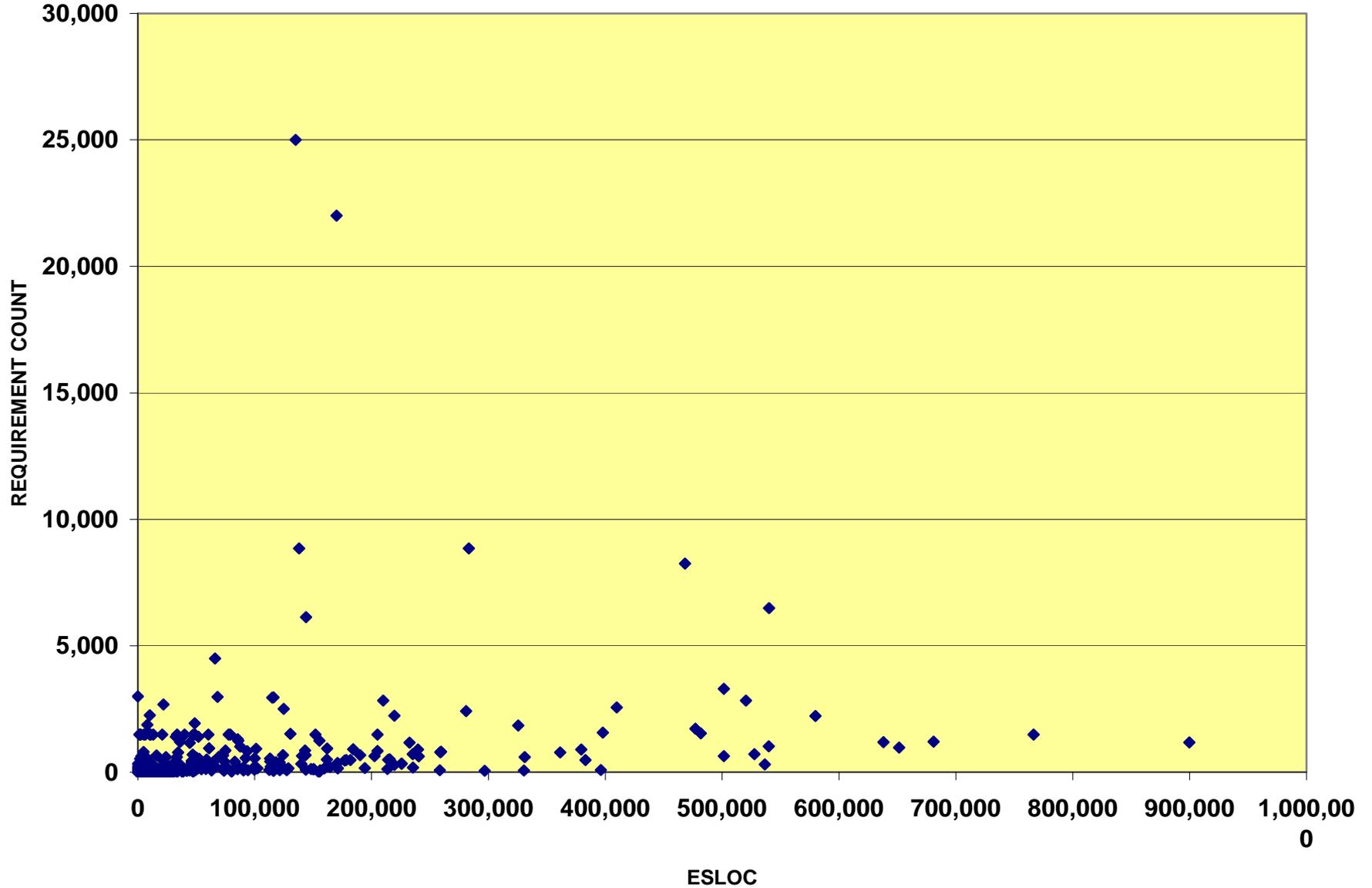
# The Good – What can we glean

- Requirements stability on performance – fact or myth
- Productivity by CMMI Rating
- C++/Java and ADA Productivity
- Peak Head Count by ESLOC/Month

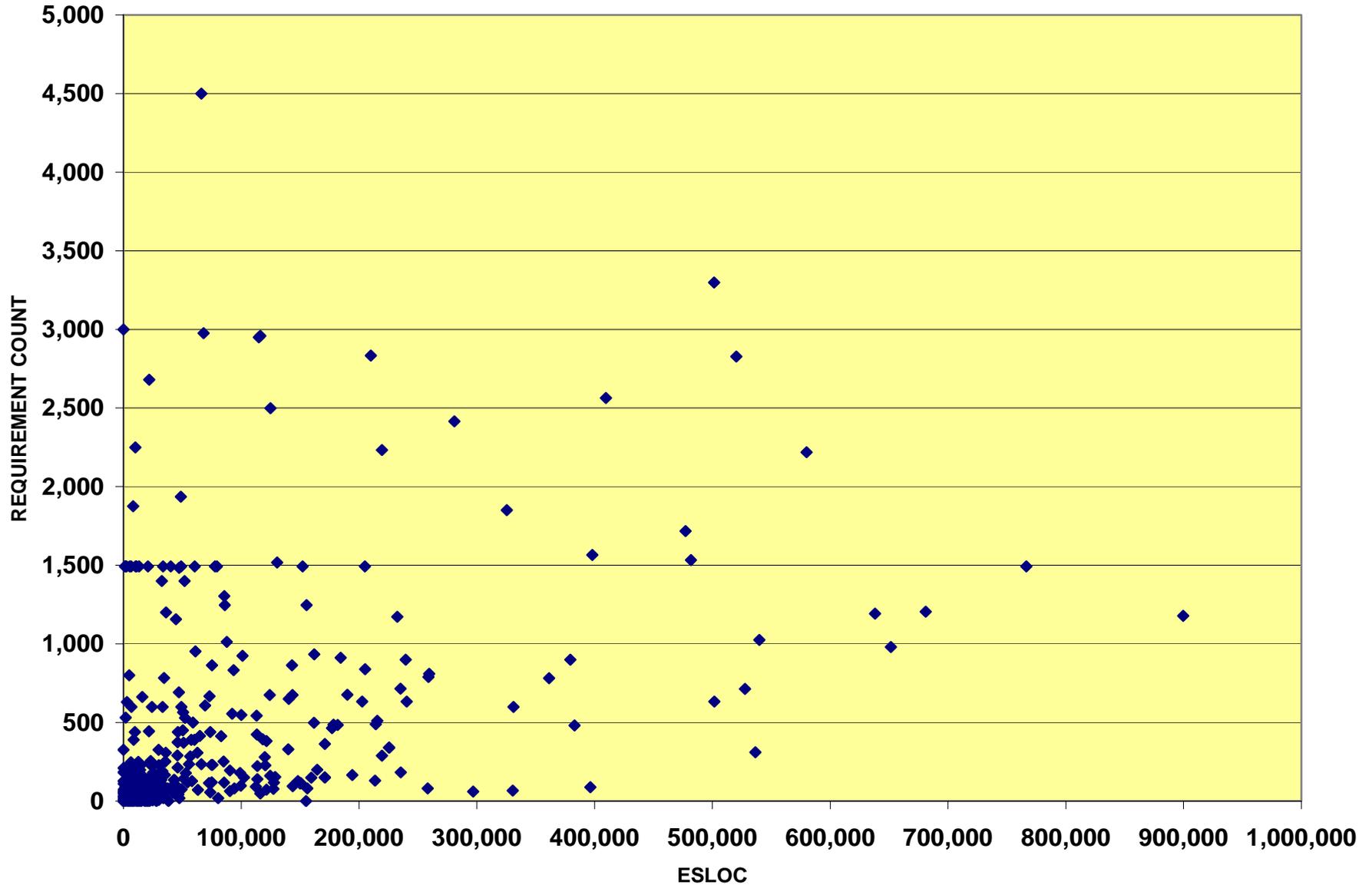
# Hours, SLOC, and Requirements



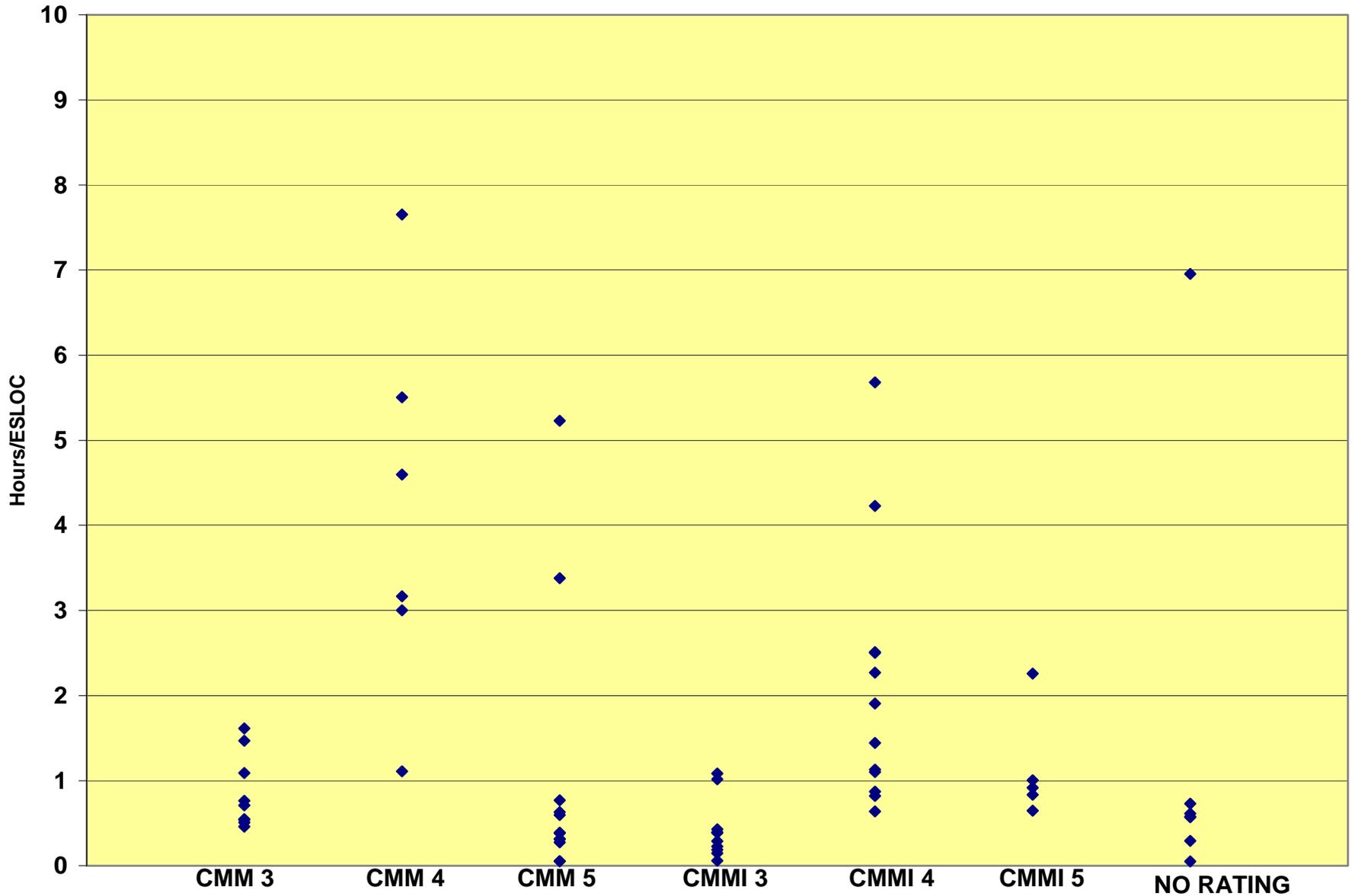
# ESLOC and Requirements



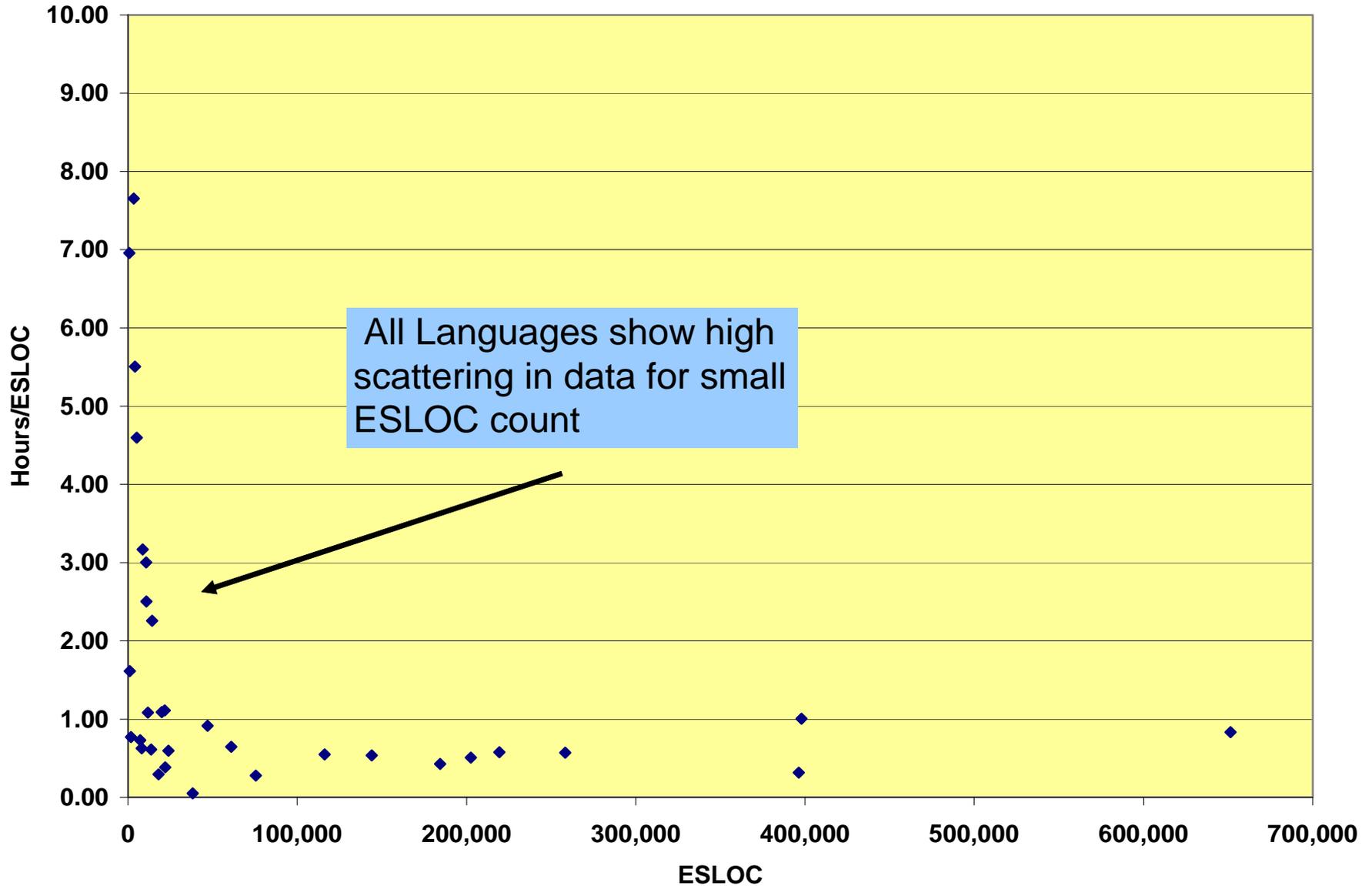
# ESLOC and Requirements (<5000)



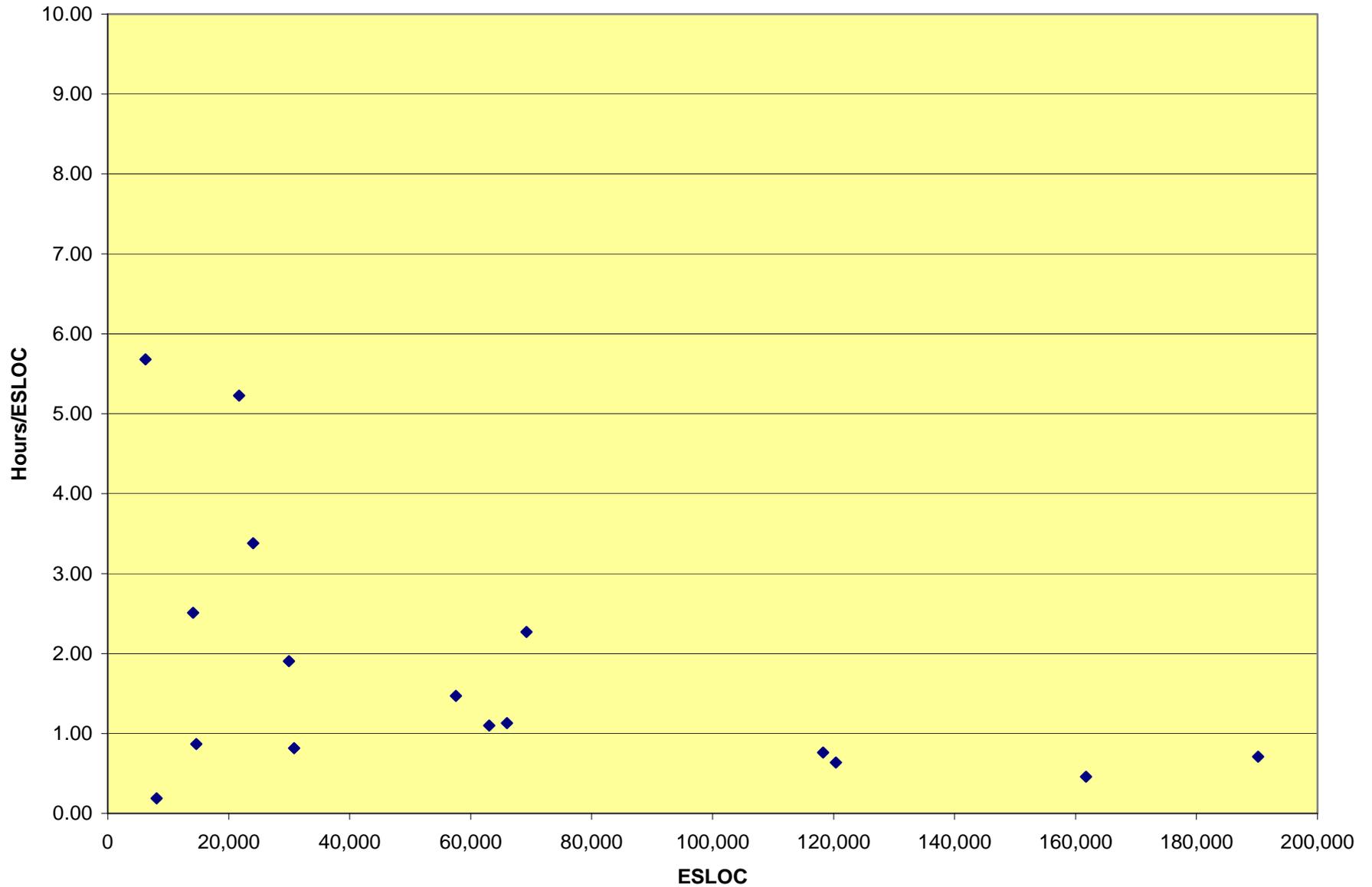
# Productivity By CMM/CMMI



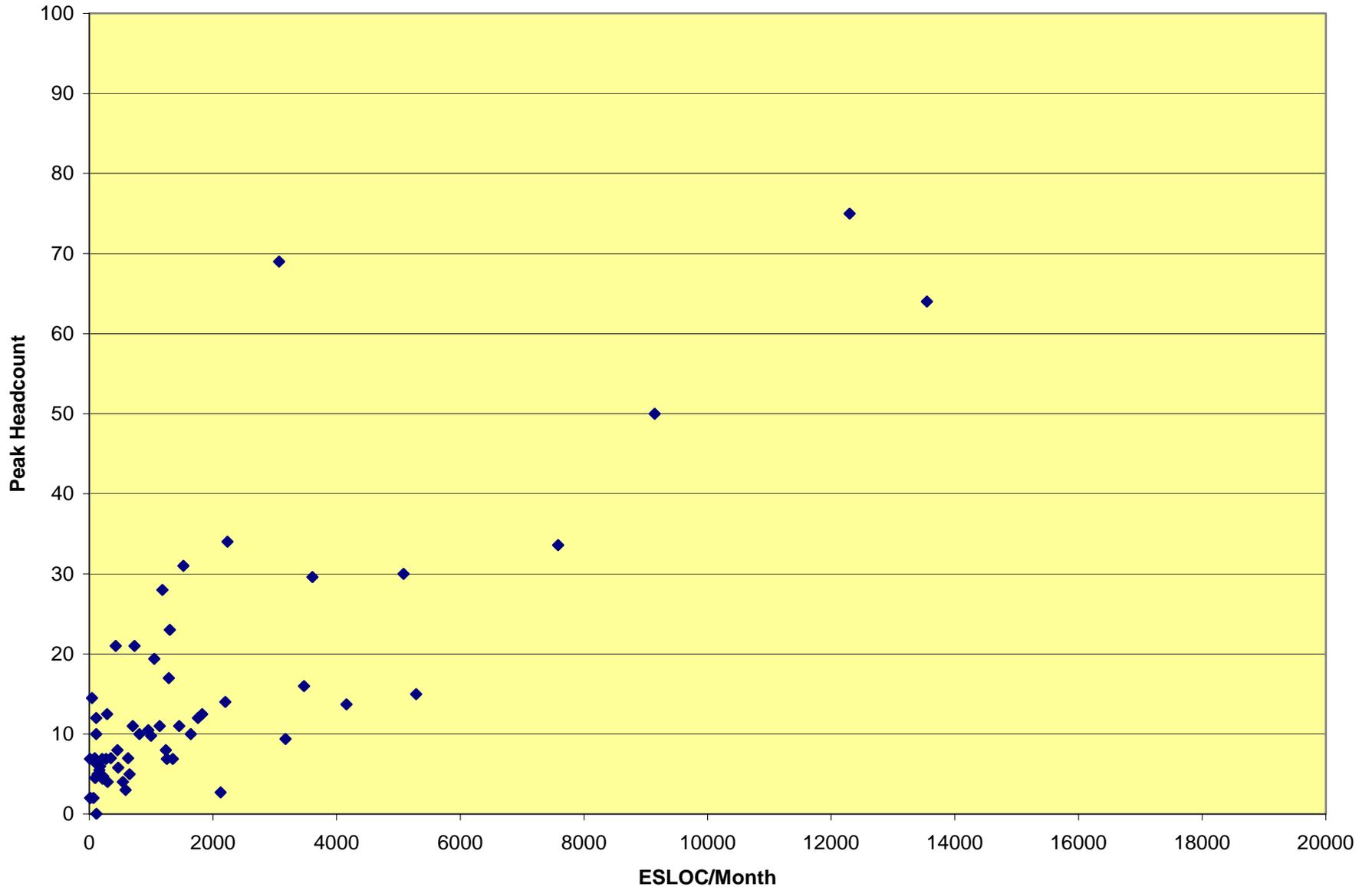
# C++/JAVA Productivity



# ADA



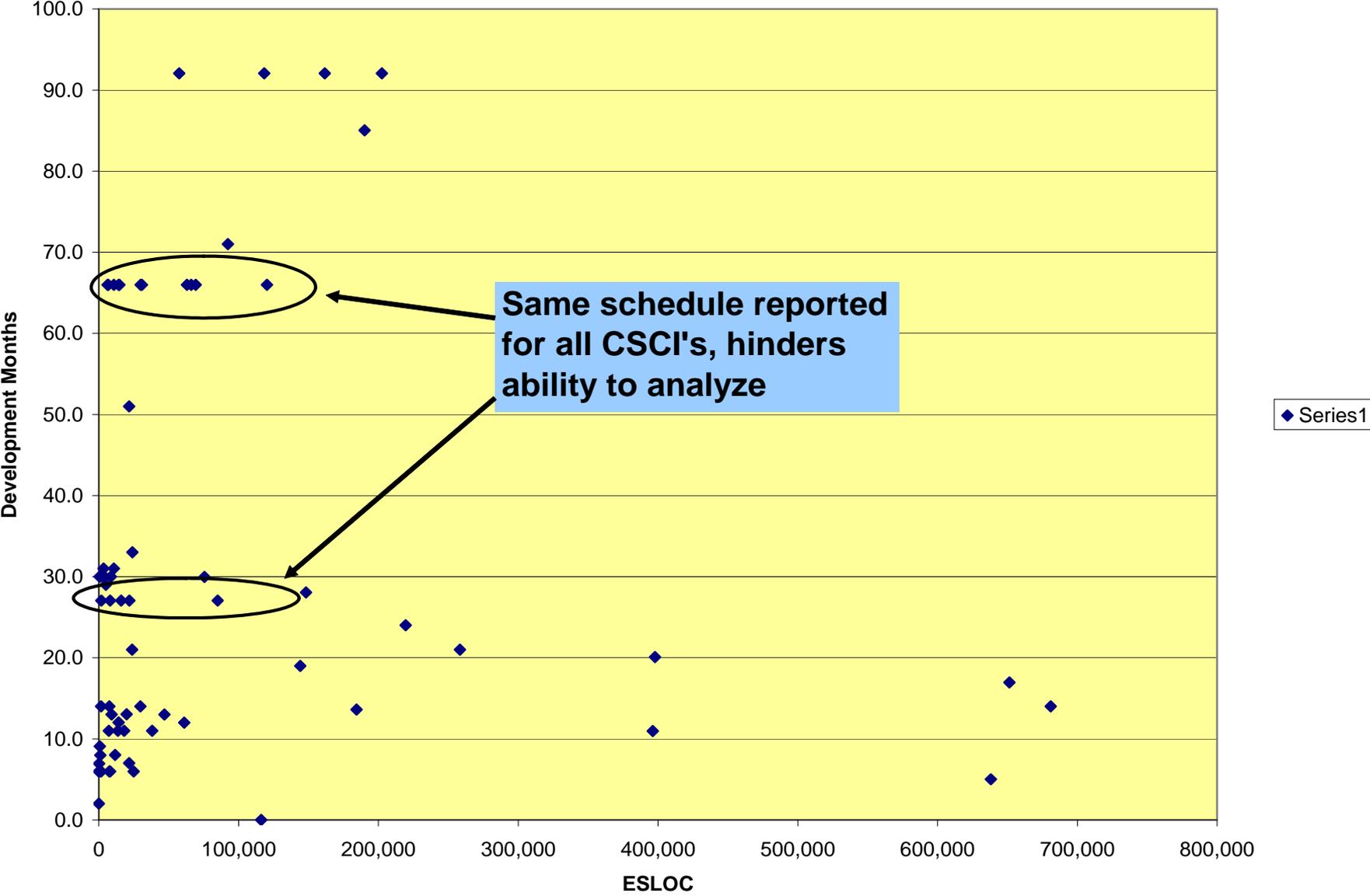
# Peak Head Count by ESLOC/Month



# Issues in SRDR data

- ESLOC is our guess – contractors do not report conversions for modified and reused code
  - New DID helps this
- Multiple counting conventions – Physical, Logical, PLC Rung Ladders
  - New DID requests a count in logical in addition to method used by contractor
- Programs tend to report one schedule for all CSCI's and/or for all builds planned
  - See chart
- Significant delays in submitting SRDR's and revisions
  - Size and hours frequently change by submit

# Schedule versus Size



# Way Forward

- Many commands interested in flowing SRDR requirements to ACAT II and III programs with significant software development.
  - Mechanics, consistency, storage are issues
  - SPAWAR has codified
- Continue to consolidate and publish SRDR data
  - Modify format for new DID
  - Builds on the excellent framework established by DCARC
- Software maintenance and program enhancements after SDD remain a gapping hole in collection and reporting
  - Needs its own reporting method
  - Enforcement may be an issue – generally not on CAIG radar so no mandated data collection report

# Way Forward

- SW estimation training offered through DAU should have a whole section on SRDR and data fields being collected
- Revisit the SRDR DID in a couple of years to evaluate if the new data collected meets DOD needs or if it needs revision
  - Software development techniques are evolving rapidly, our collection system must be adaptable
- Establish a team to work on:
  - Software maintenance data collection formats
  - Improving contractor data submittal by sharing findings with contractors/site visits
  - Issues related to collecting information on other programs
    - Enforcement, access of data, cost to collect, reviewed or not

# How NAVAIR Estimates with SRDR

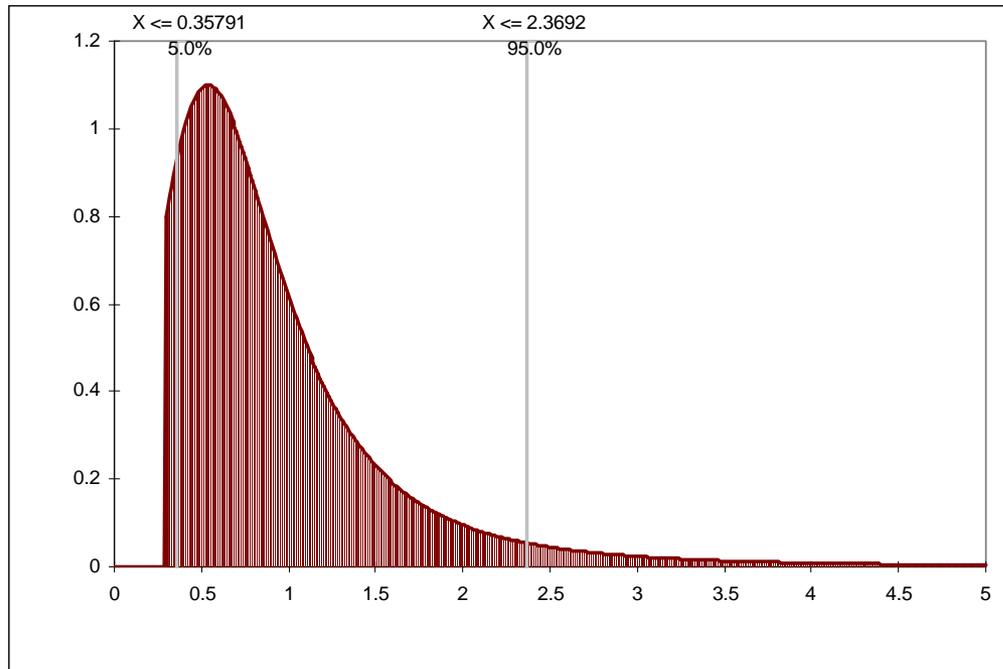
- Prior to SRDR we used two methods
  - Point estimate of hours/ESLOC and software growth
  - Parametric model – SEER, COCOMO II, etc
- Data was old and very few data points – in general used 2 to 3 hours/ESLOC
- No access to parametric model data sets
- No ability to articulate possible range of costs
- No cross checks available to determine if sizing information made sense
- Insensitive to language, counting convention, application

# How NAVAIR Estimates with SRDR

- SRDR gives us unrivaled data to develop estimating relationships from
- We have evolved to a risk based estimate approach using SRDR data sorted by language and application type
- We also use the NAVAIR ESLOC Model (NEMO) to apply growth to software sizes
  - This is to account for the growth between initial estimates and contract award
  - Growth is not a significant factor when doing proposal evaluations based on behavior in SRDR data
- Cross checks with COCOMO performed, otherwise we have stopped using all parametric models

# How NAVAIR Estimates with SRDR

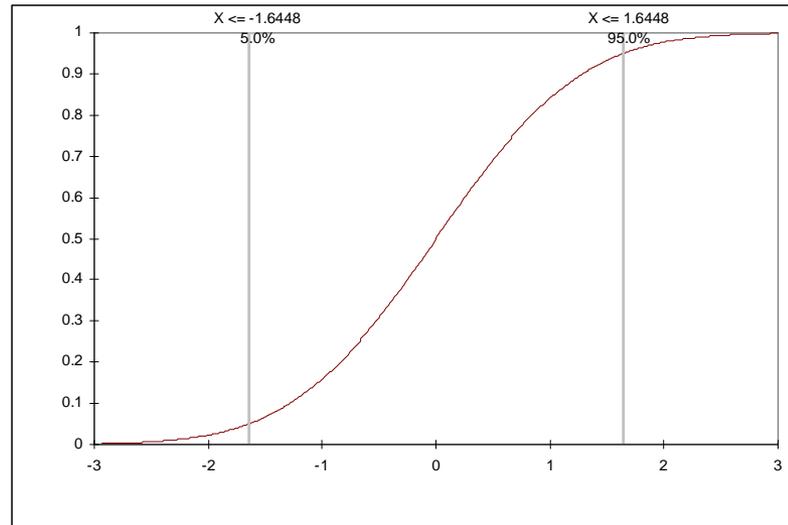
- SRDR data is scattered to the point that a risk based estimate is the only current logical approach
  - Data sorted by language type and application
  - A distribution is fit to the hours/ESLOC data to arrive at a risk based range of costs



For a point estimate we use the mean, but we always show the total range of outcomes

# How NAVAIR Estimates with SRDR

- For an initial estimate we use a combination of growth on ESLOC and the previous productivity distribution to arrive at a range of costs
  - SRDR data largely captures SW CM, SW QA, development environment support, and SW PM as part of reported hours
- Estimate is portrayed as an S-Curve which gives the PMO an opportunity to determine risk tolerance level



# Where we want to get to

- As database is populated we want to refine analysis to address
  - Company specific CER's
  - CMM/CMMI ratings
  - Headcount over time methods – this actually looks to have the most promise from a “tightening up the range” perspective
  - Builds versus projects
  - Further breakdown of application types
- Change perception that this is a cost data report
  - Get software technical community to review submits for consistency
  - Provides a start to software metrics initiatives

# How to gain access to data

- Data is available to government and FFRDC only, contractors are a rare exception
- You need to obtain a certificate from DCARC to access the data base
  - Register for DACIMS 3.0 – this gives you access to individual SRDR reports and dictionaries
  - <http://dcarc.pae.osd.mil/>
  - After registering contact me and you will be put in for access to the software e-room – this is where the compiled Excel file is hosted

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# Summary

- SRDR data provides analysts information to develop better cost estimates
- Provides cross checks for size, schedule and staffing
- Is comprised exclusively of DoD program information
- We are aware of issues in the data and are working to correct
  - Inputs from other users welcome
- SRDR information is transforming how NAVAIR estimates software
  - Highly defensible estimates when you can talk to specific program and contractor information
  - Analytic tools developed and refreshed as data becomes available