



# **UNIFIED CODE COUNT (UCC)**

## **ARR 2015**

**USC CSSE**

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# What is UCC?

- Counts lines of code in software source files
- Key counting capabilities
  - Physical/Logical SLOC
  - Blank Lines, Comments
  - Compiler Directives, Executable Instructions
  - Keywords
  - Cyclomatic Complexity
  - Differencing
  - Duplicates
  - Custom extensions

# Operational Concepts

## USC DR Students

- 40-50 Graduate students
- 5-10 hours/week
- 5 – 8 projects per semester
  - Added Functionality
  - Additional Metrics
  - New Language Support
  - Maintenance
  - Integration
  - Process Improvement

## The Aerospace Corporation

- Evaluate code for buffer overflows and vulnerabilities
- Work closely with client to pass security filters, making required changes
- Independent Verification & Validation

# UCC Development and Deliverables

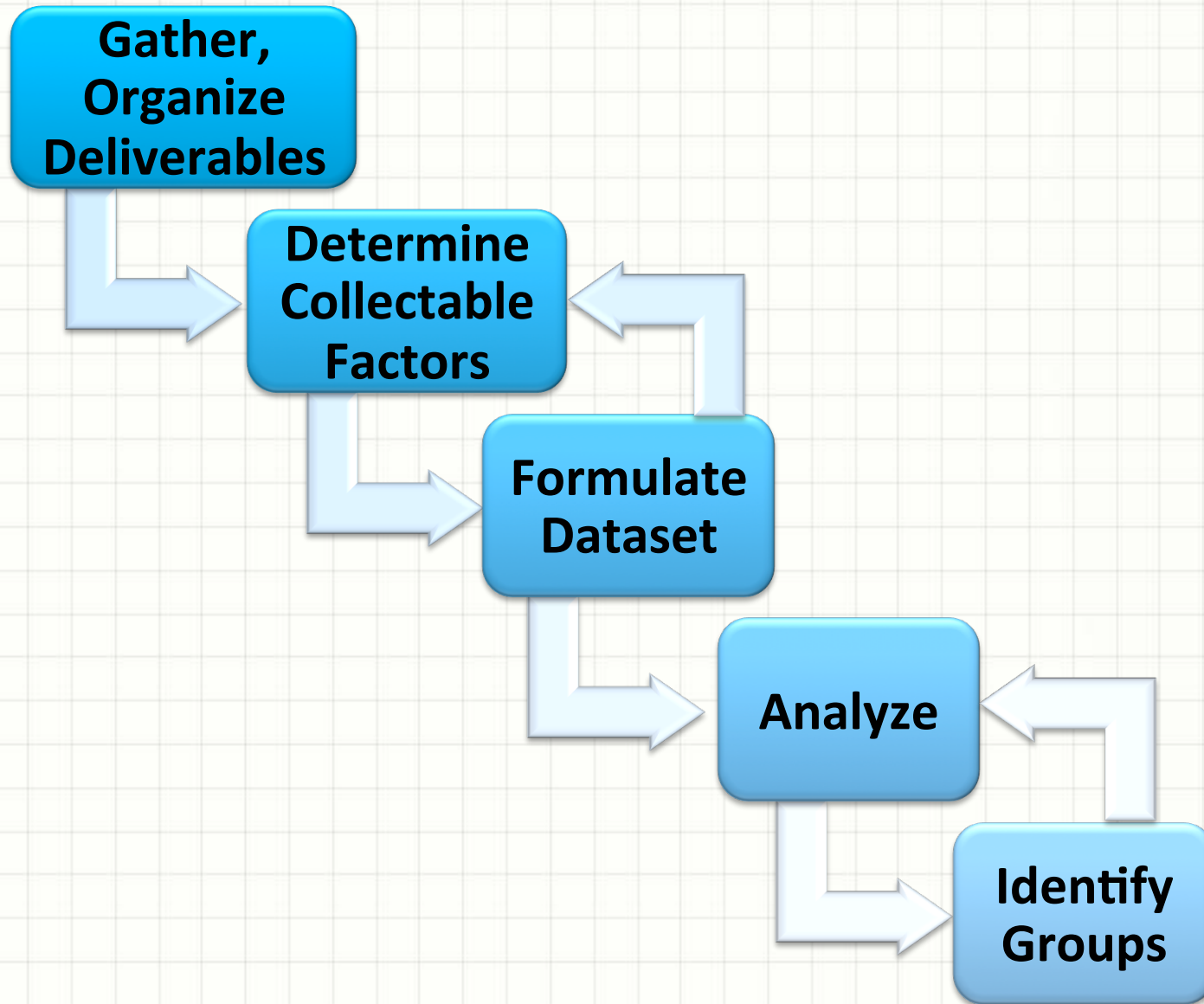
## Development Phases

- Research and Documentation
- Implementation and Testing
- Extensive Testing and Documentation
- Integration and System Testing

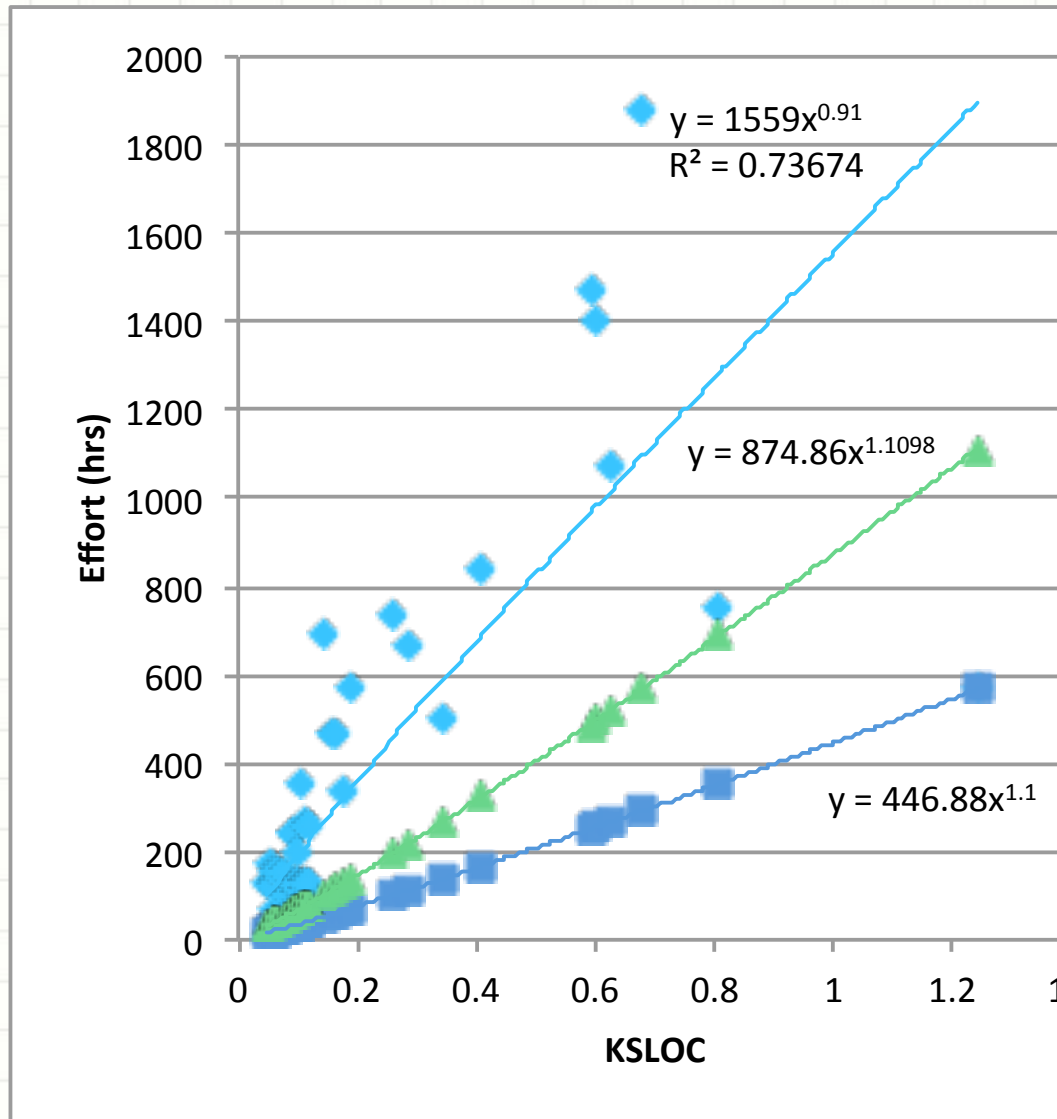
## Semester Deliverables

- Timesheets (hours)
- Project Plan
- Weekly Status Reports
- Source Code
- Test Cases
- Test Code
- Final Report

# UCC Data Analysis Process

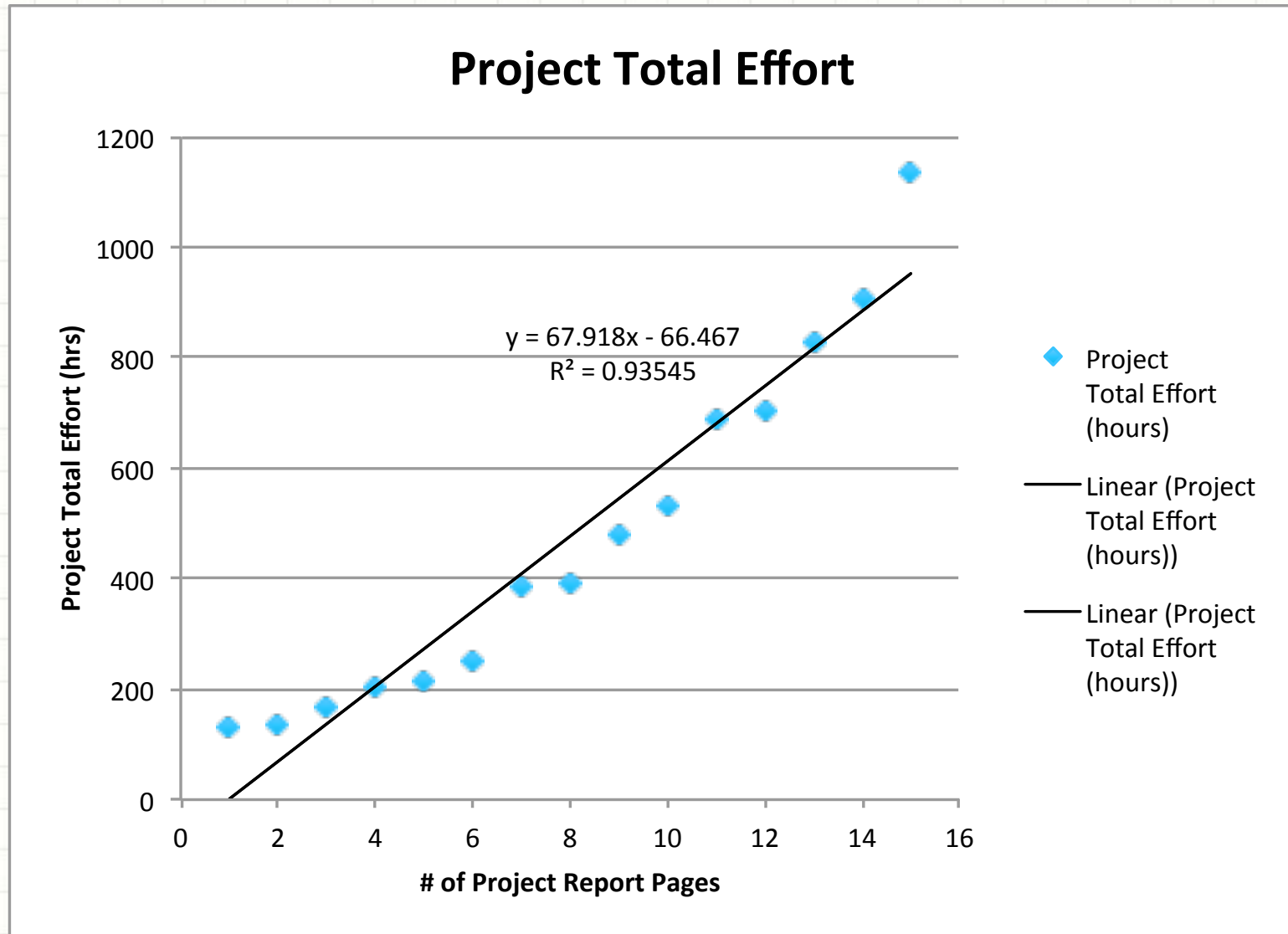


# COCOMO<sup>®</sup> II Comparison

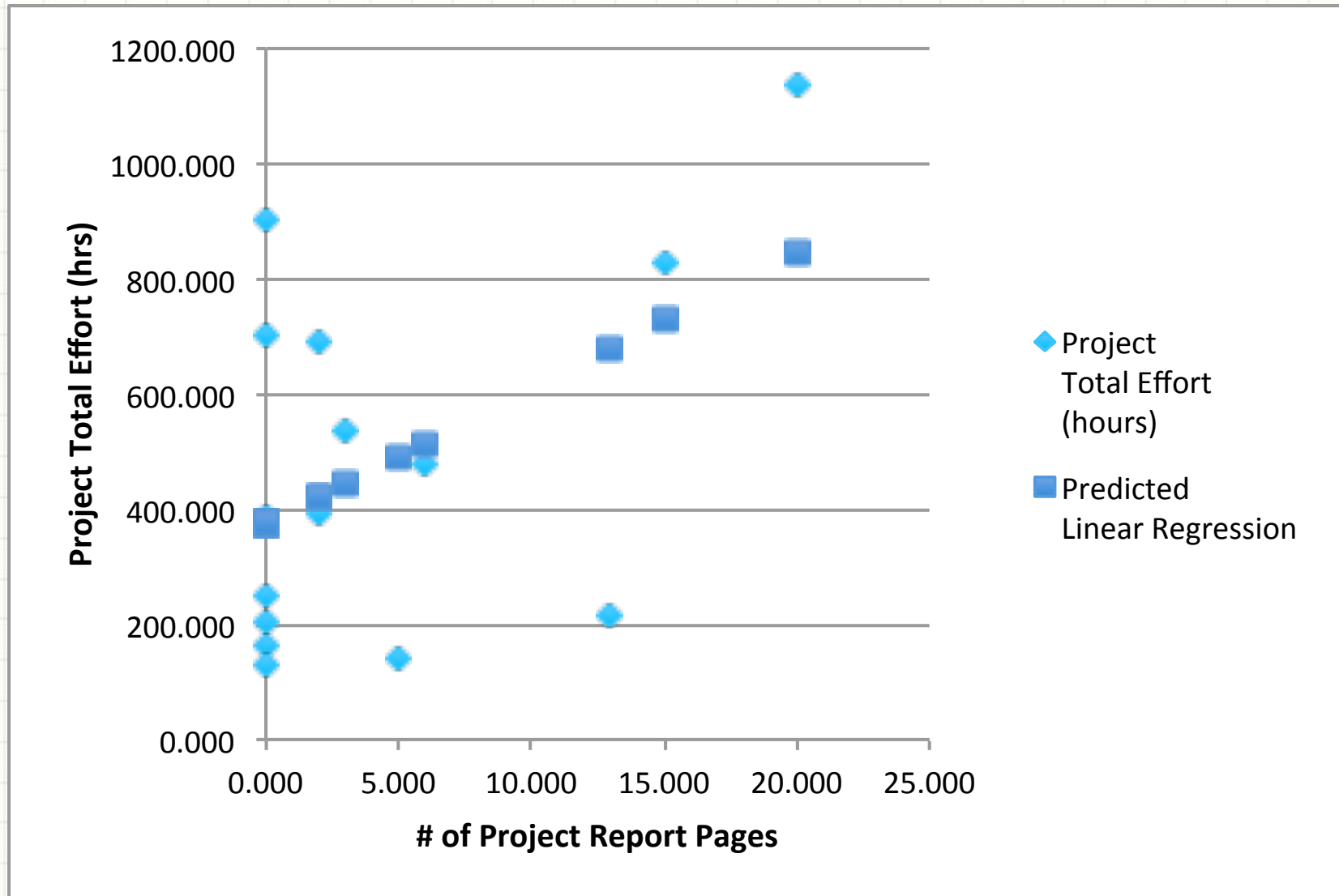


- **FLEX = Low**
  - Conformance with pre-established requirements
- **ACAP = Low**
  - Low-level understanding of high-level requirements/effects
- **PCON = Very Low**
- **PLEX = Low**
- **TOOL = Very Low**
  - Edit, Code, Debug

# Documentation Effort

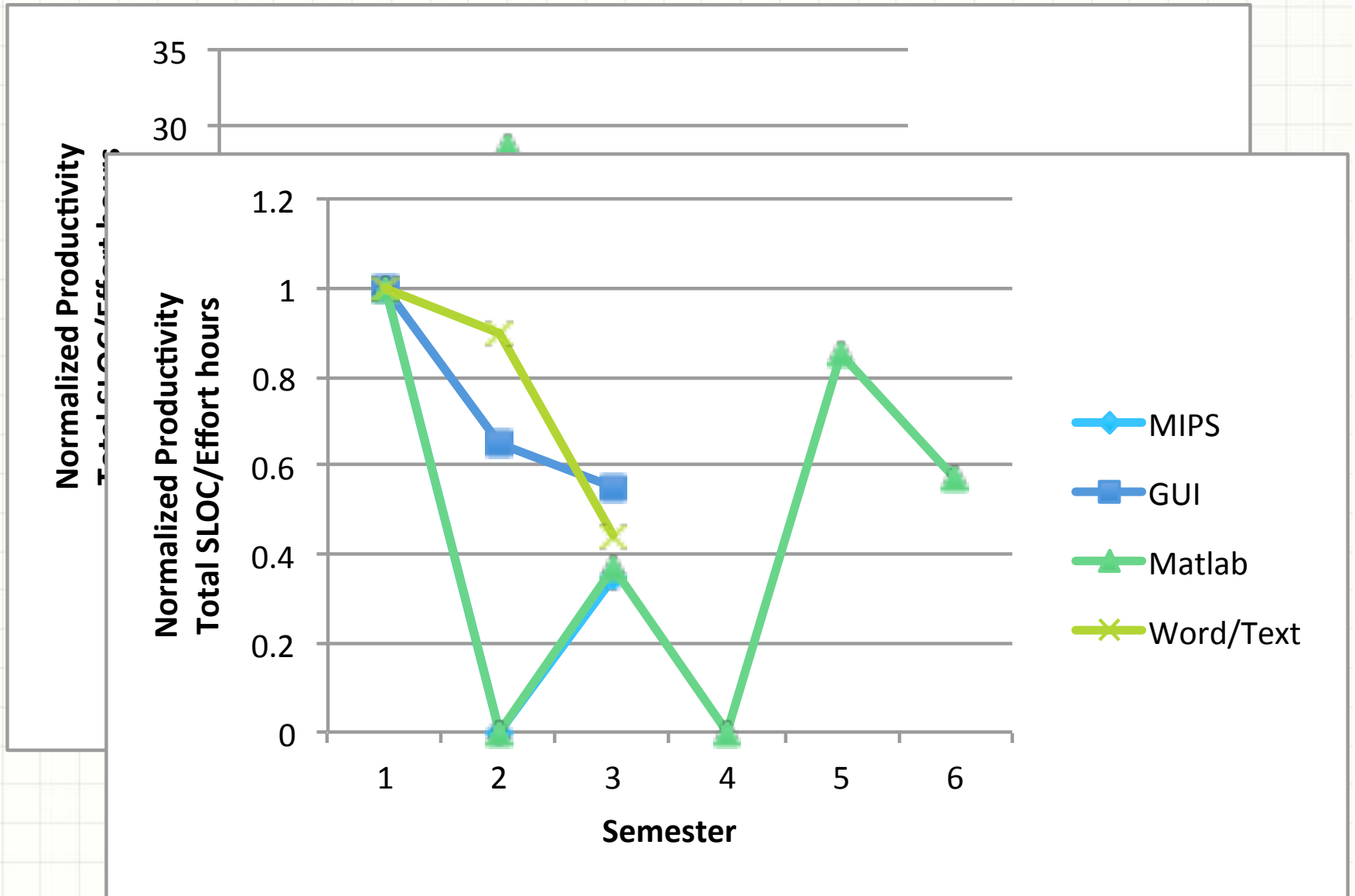


# Documentation Linear Regression

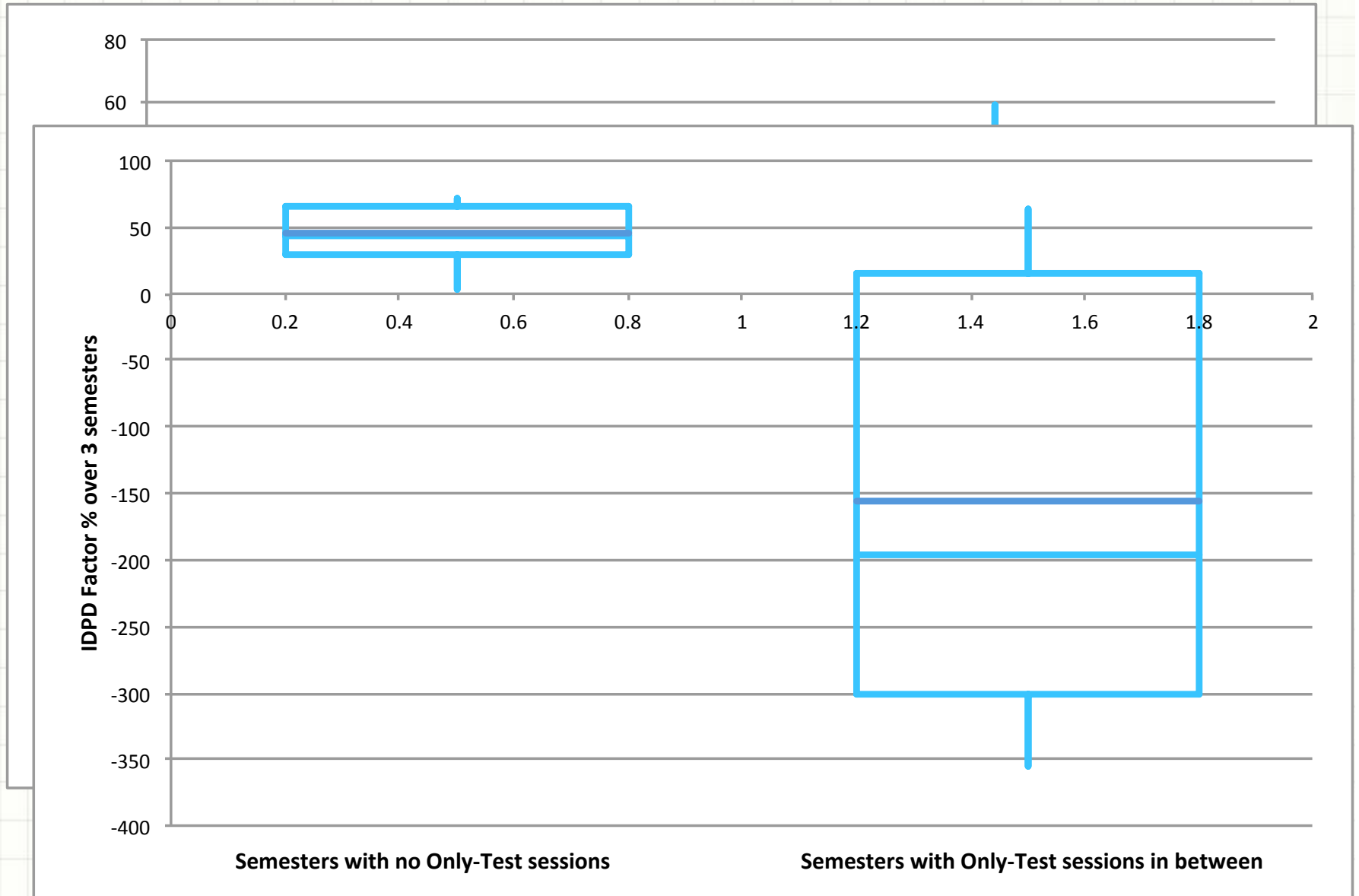




# IDPD Observation



# Reduction in IDPD Factor



# IDPD Factor Statistics

IDPD Factor %	With no Test-only Semester		With Test-Only Semester	
	Mean	Median	Mean	Median
<b>2 semesters</b>	37.5344	34.1349	-39.8803	-71.1138
<b>3 semesters</b>	44.6844	43.3956	-155.7607	-196.6872

IDPD Factor %	F-value	p-value
<b>2 semesters</b>	5.0656	0.0481
<b>3 semesters</b>	6.7635	0.0265



# FUTURE STEPS AND ANALYSES

- Re-use SLOC
- Re-use SLOC calibration
- Re-use Documentation
- Group Analyses
- Test Data
- Defects
- Additional Factors:
  - ACAP
  - PCAP
  - SITE