



Mining PSP Data

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Agenda

Overview – the PSPSM and PSP data

Defect-removal analysis

Language-impact analysis

Summary and conclusions

SM Personal Software Process and PSP are service marks of Carnegie-Mellon University.



Overview - PSP

The Personal Software Process (PSP) is a process framework to guide developers in

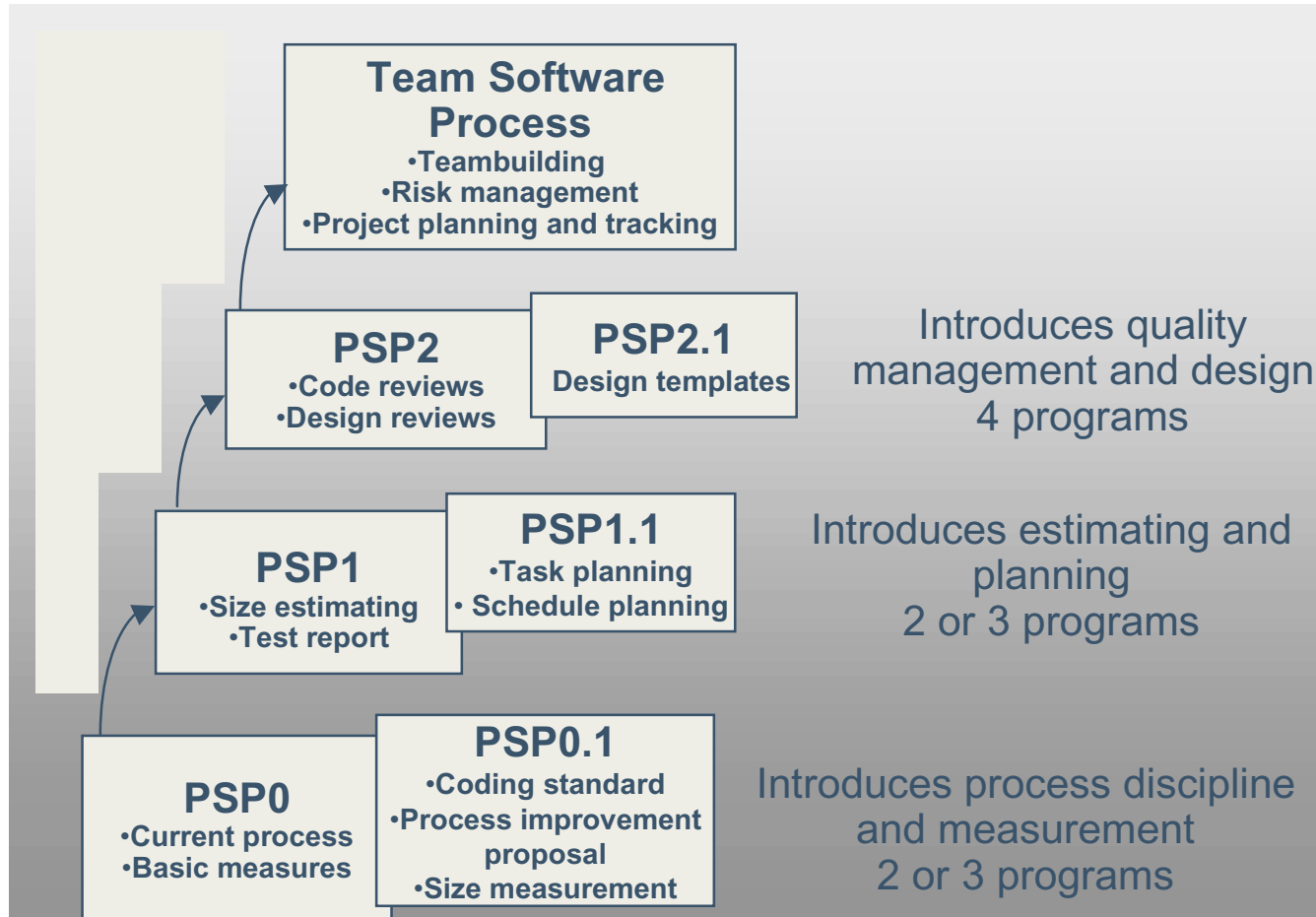
- defining their own processes
- planning and tracking their own work
- managing the quality of the products they produce

PSP principles

- Project success is governed by team performance.
- Team performance depends on member performance.
- Member performance is determined by member practices.
- To consistently improve, developers must use defined and measured processes.



The PSP Course





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Overview – PSP Course

In the PSP course, developers write 8 to 10 programs.

The standard PSP programs are 1 or 2 size counters and 7 or 8 statistical calculations.

Average program size is 107.8 lines of code.

Average development time is 3.98 hours per program.



Overview - PSP Data - 1

When using the PSP, developers gather and use data.

Time data

- The time in minutes spent by development task
- Interruption time is not counted.

Size data

- Product size in db elements, pages, LOC, etc.
- Categories: base, added, deleted, modified, reused

Defect data

- All defects removed in compile, test, review, etc.
- Type, phases injected & removed, fix time, description



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Overview - PSP Data - 2

The PSP course has now been taught for more than ten years.

The SEI has course data on

- 31,140 programs
- 3,355,882 lines of code
- 123,996.53 hours of work
- 221,346 defects

A great deal can be learned from analyzing these data.



PSP Data Analyses

The following charts show summary analyses of

- defect injection and removal rates
- productivity
- development time

Many more analyses can be made.

Based on their PSP data, developers can determine

- where and how to improve personal practices
- how and when to best find defects
- the amount of time required to do a job
- the likely number of defects to be found in test

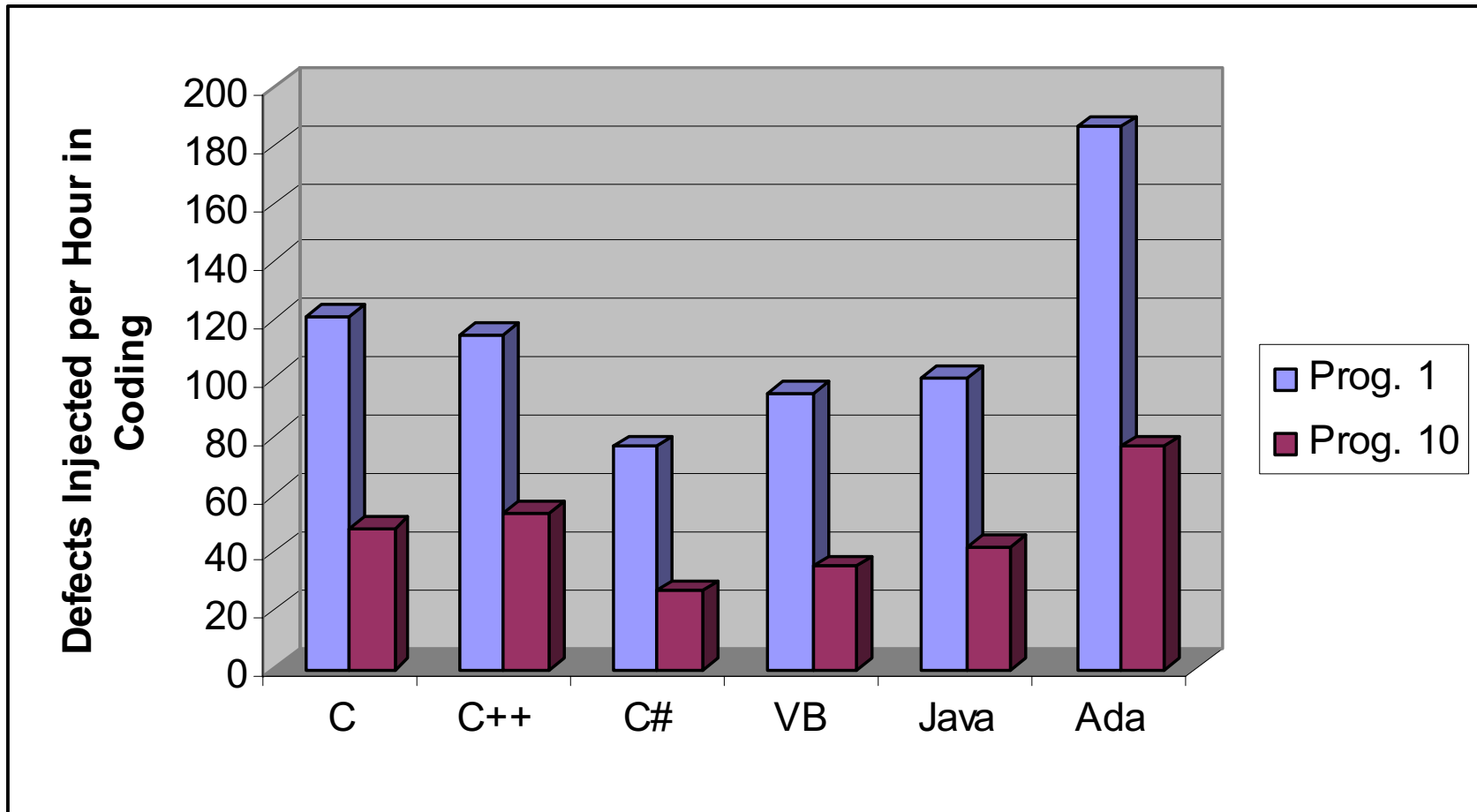


PSP Data by Language

Language	Programs	LOC	Hours	Defects
C	4,984	532,529	21,460.8	36,426
C++	3,255	448,517	14,913.4	30,785
C#	1,213	163,233	3,696.6	6,661
VB	1,353	144,621	5,108.5	7,405
Java	1,383	199,493	6,311.0	11,131
Ada	286	33,060	1,869.0	3,477
Total	12,474	1,521,453	53,359.2	95,885

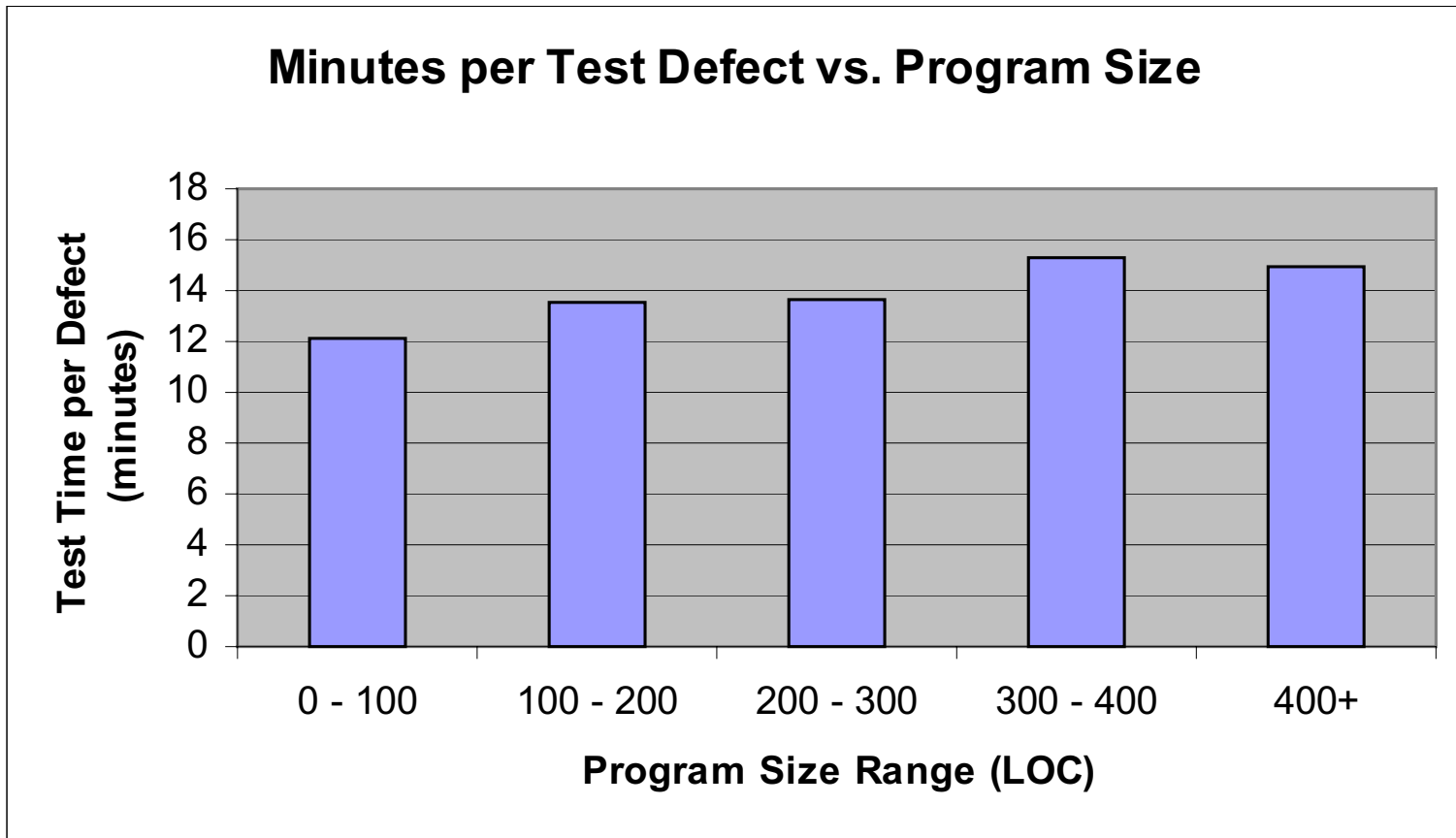


Coding Defects Injected per Hour



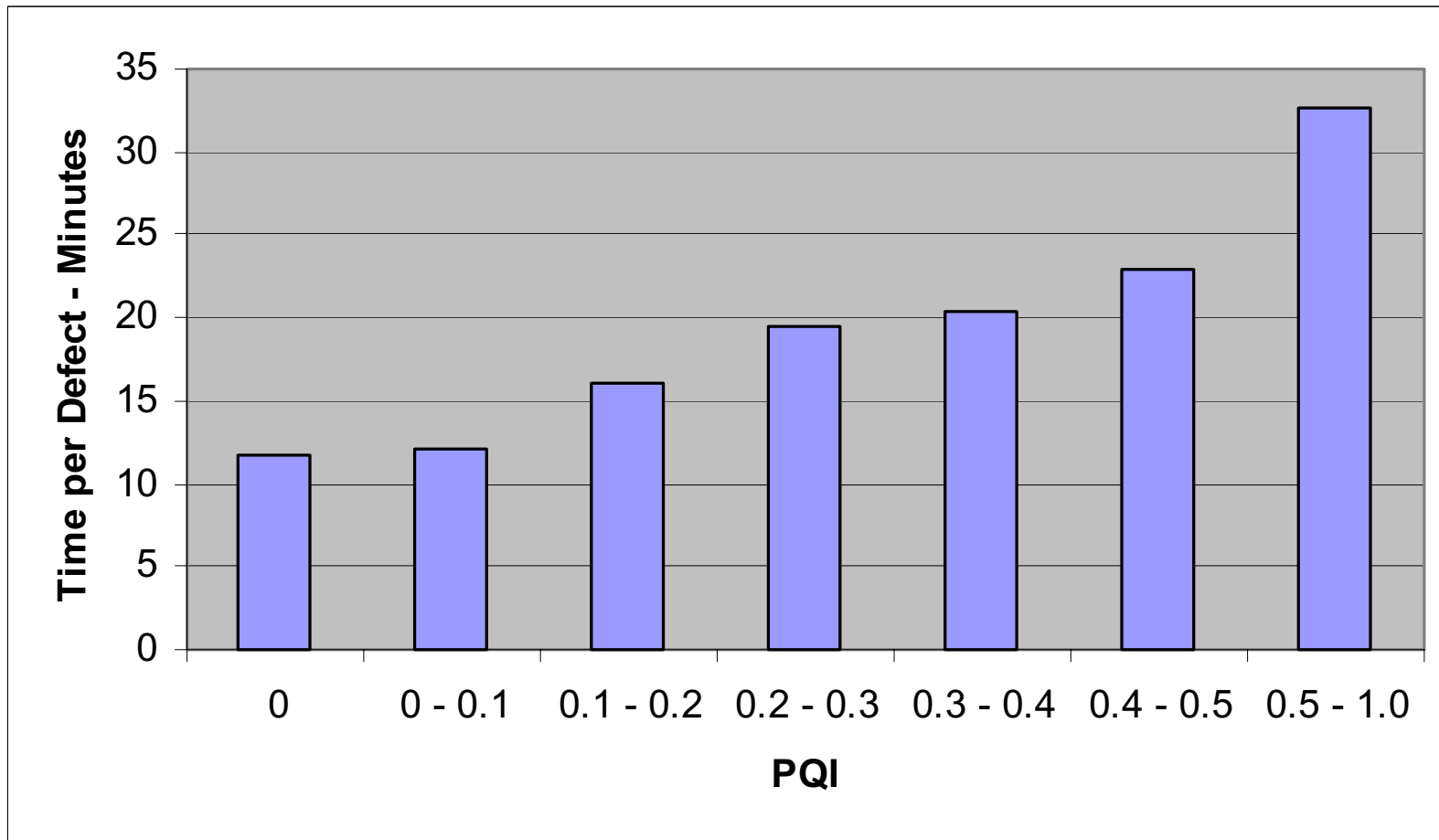


Defect Fix Time vs. Size





Unit Test Time vs. Quality





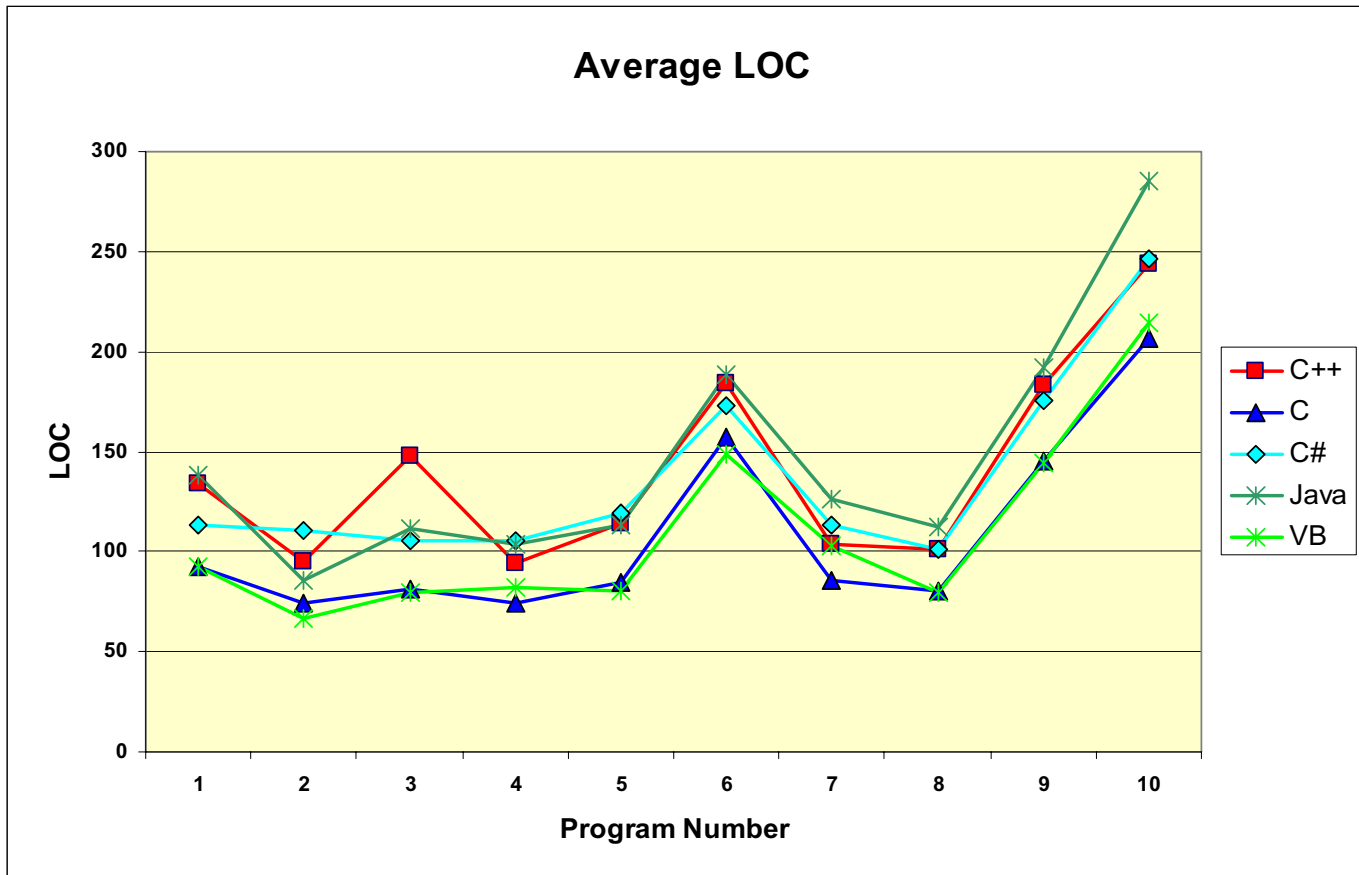
Language Impact Analysis

This analysis looks at the data separated by the following languages and sample sizes.

Language	Sample Size
C	455 to 521
C++	271 to 343
C#	107 to 127
VB	119 to 146
Java	129 to 144

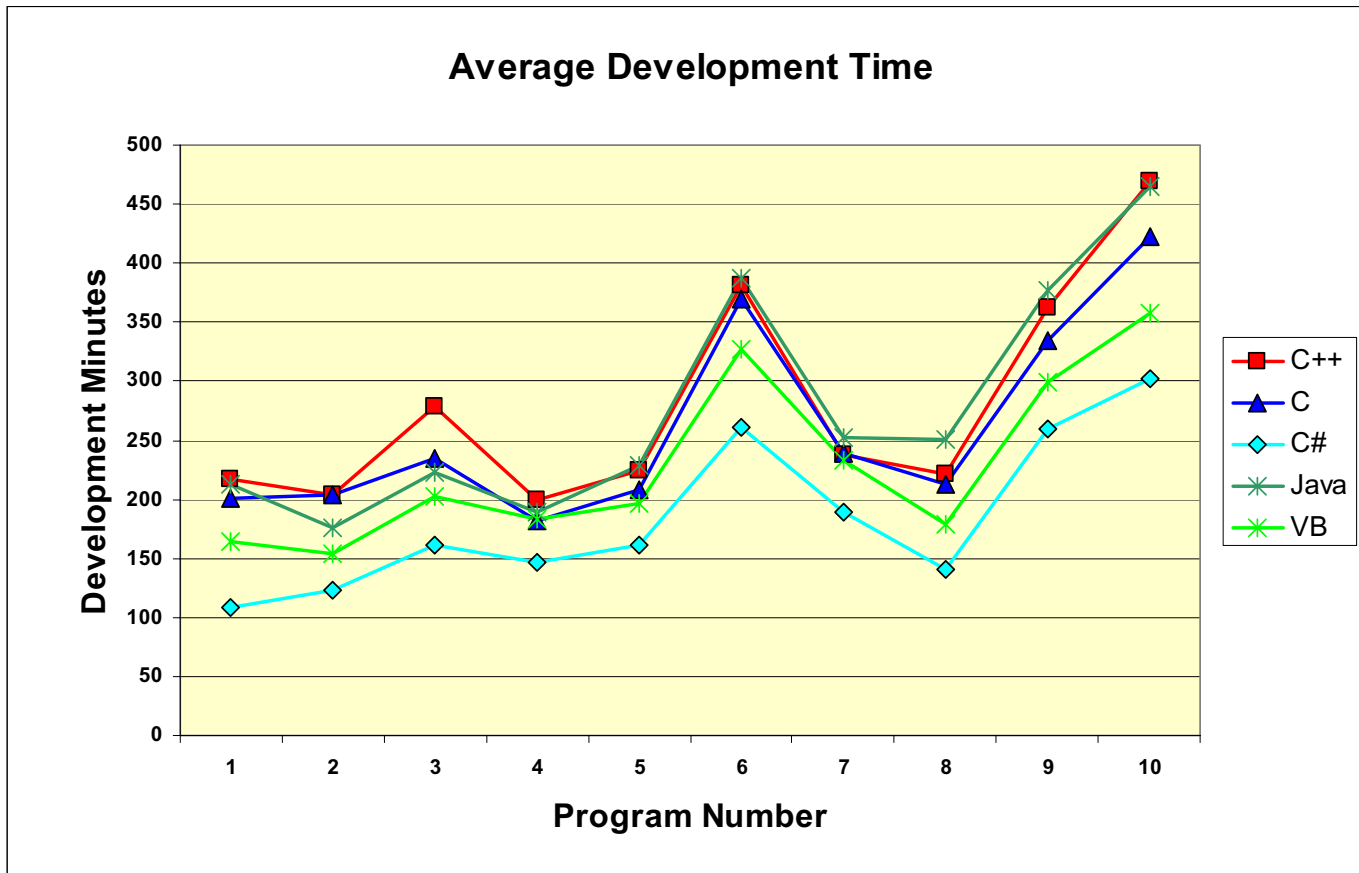


Program Size



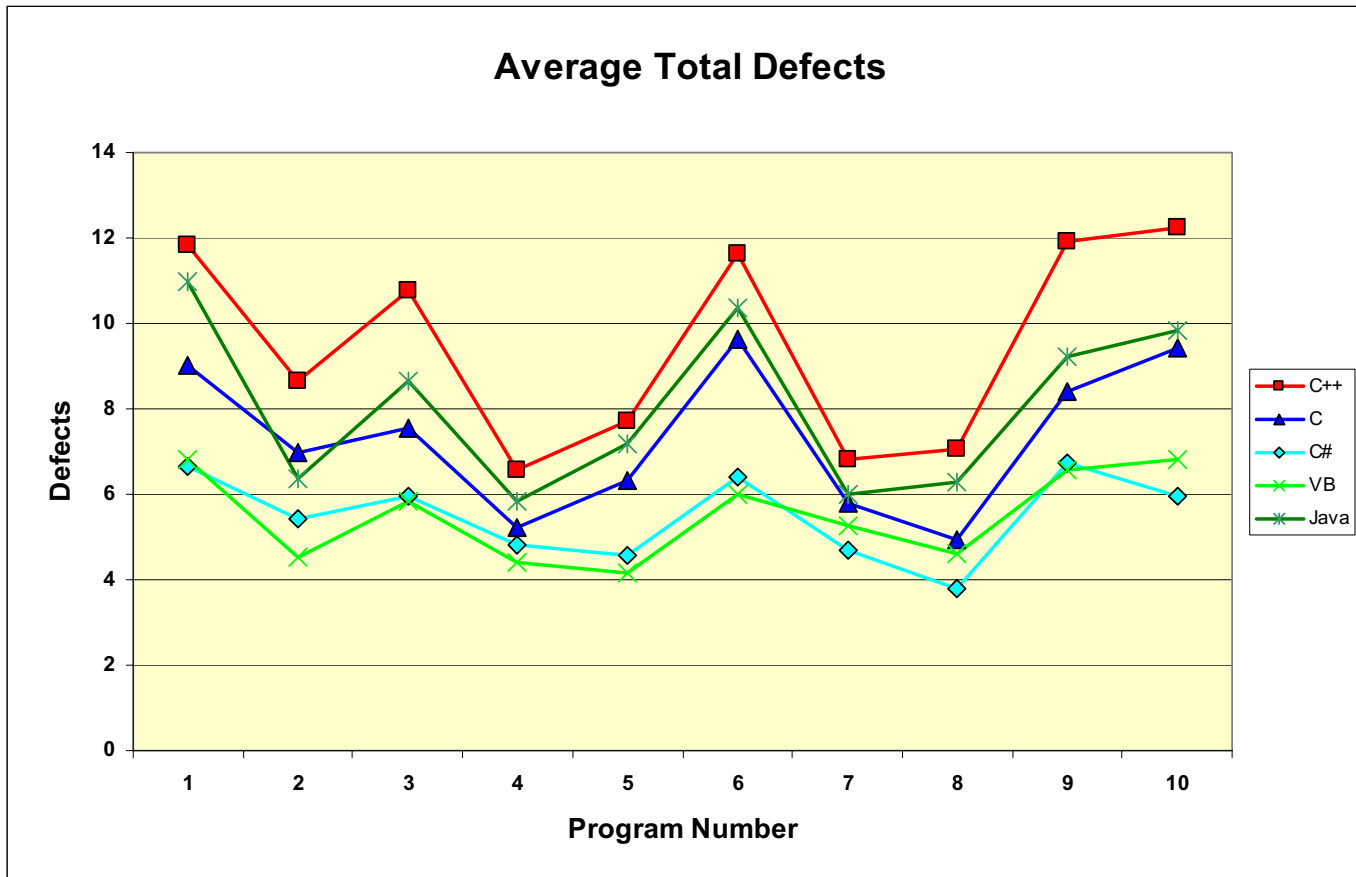


Development Time



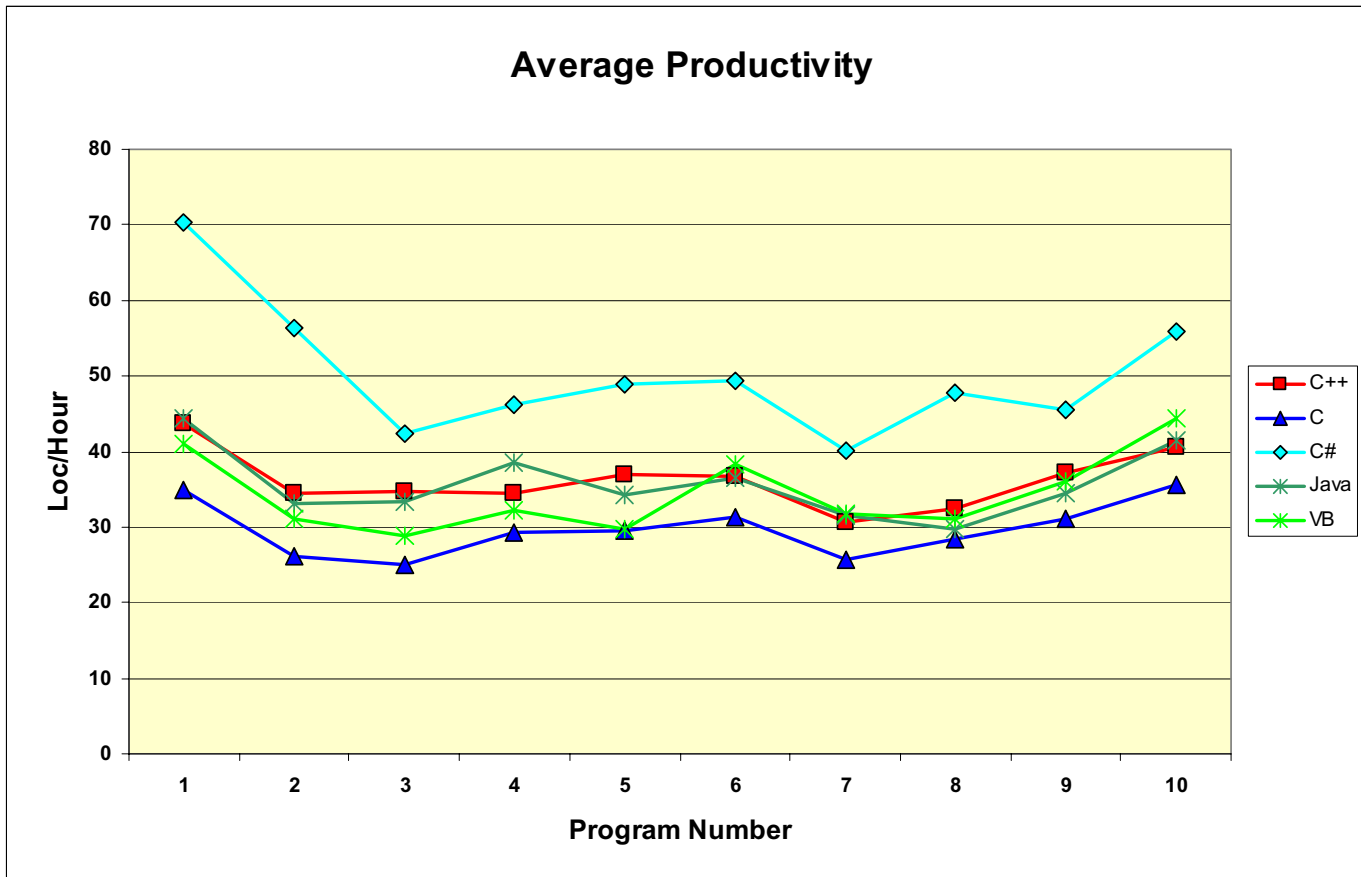


Total Defects



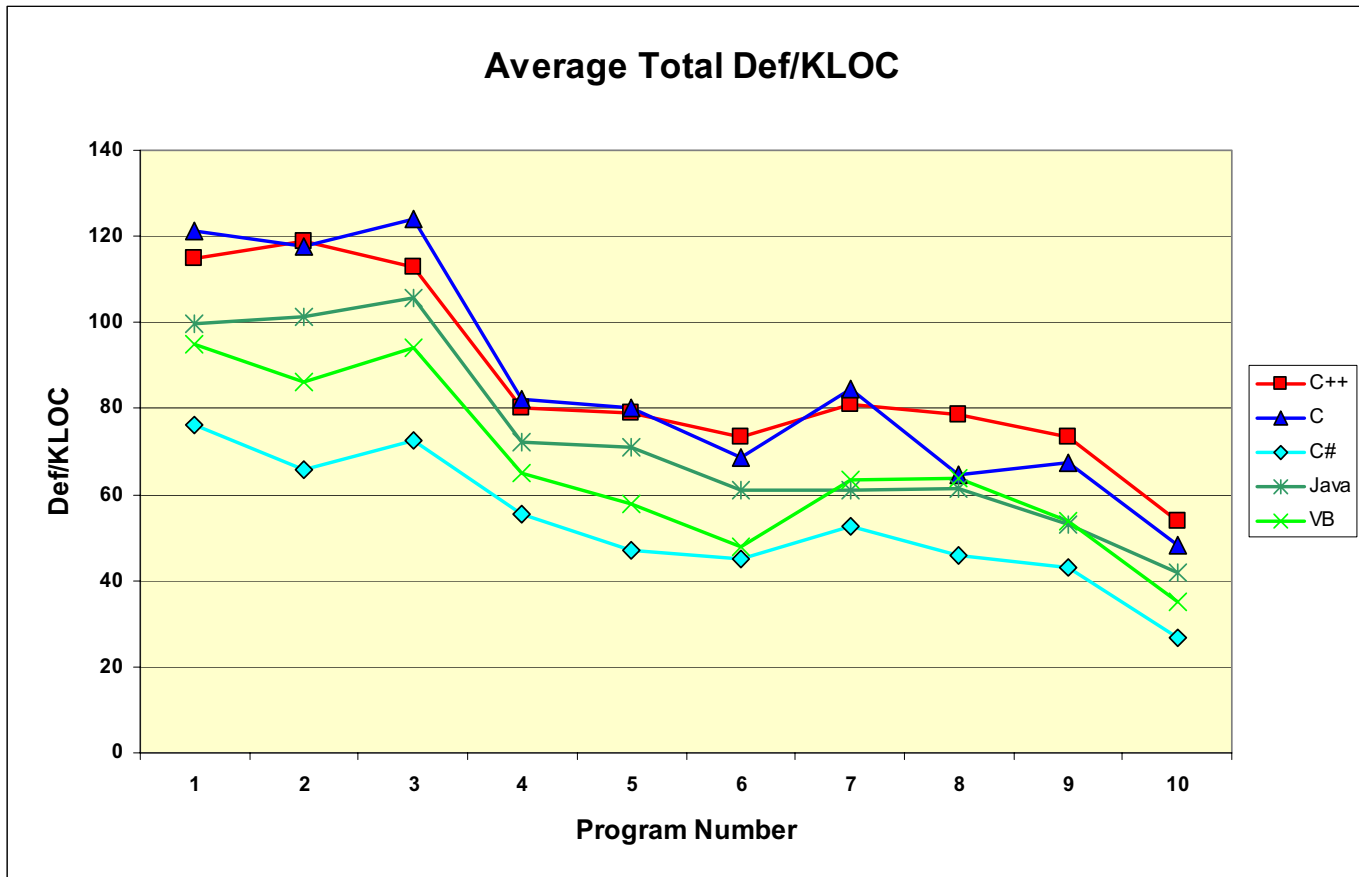


Productivity



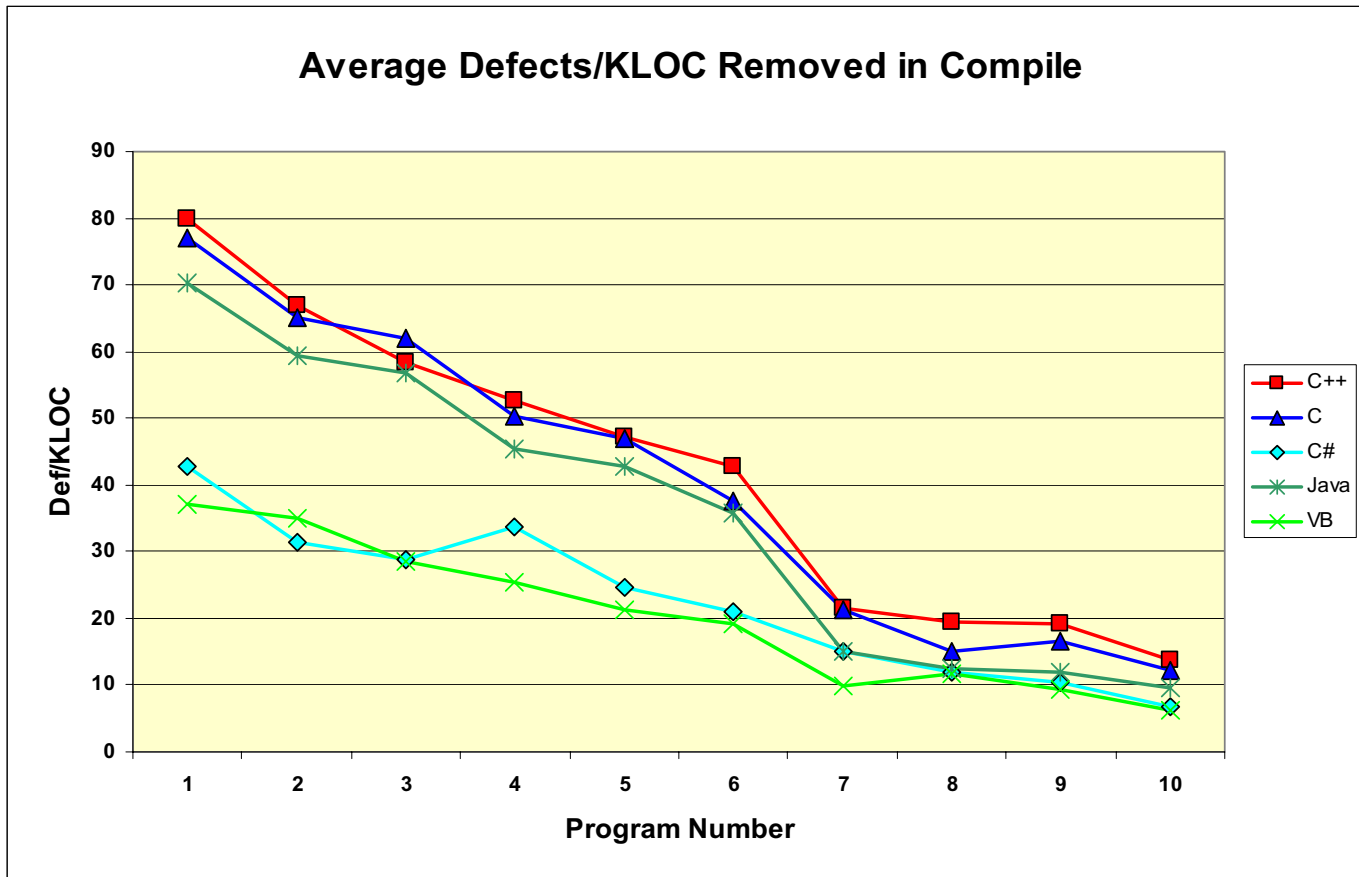


Total Defect Density



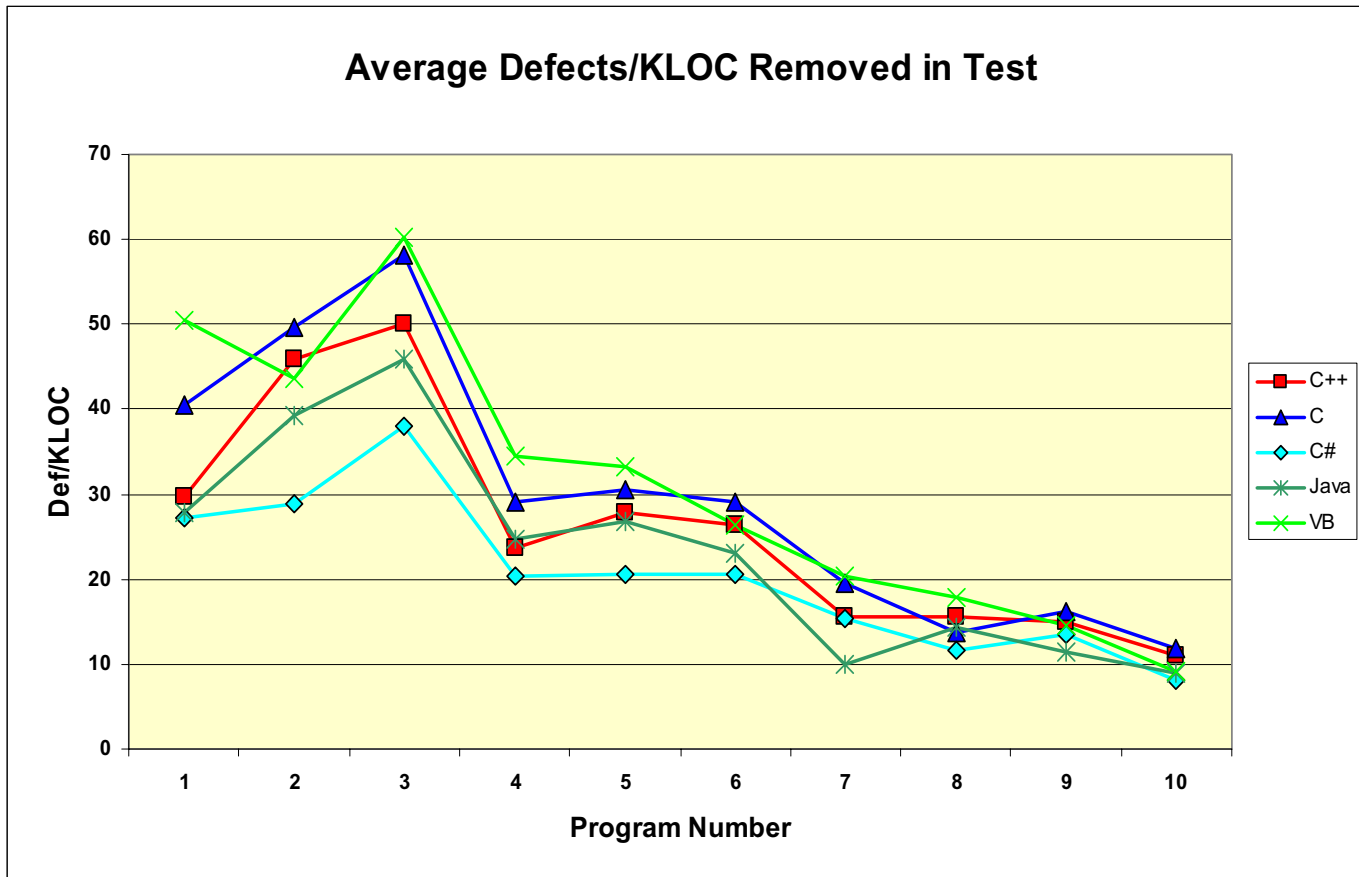


Compile Defect Density



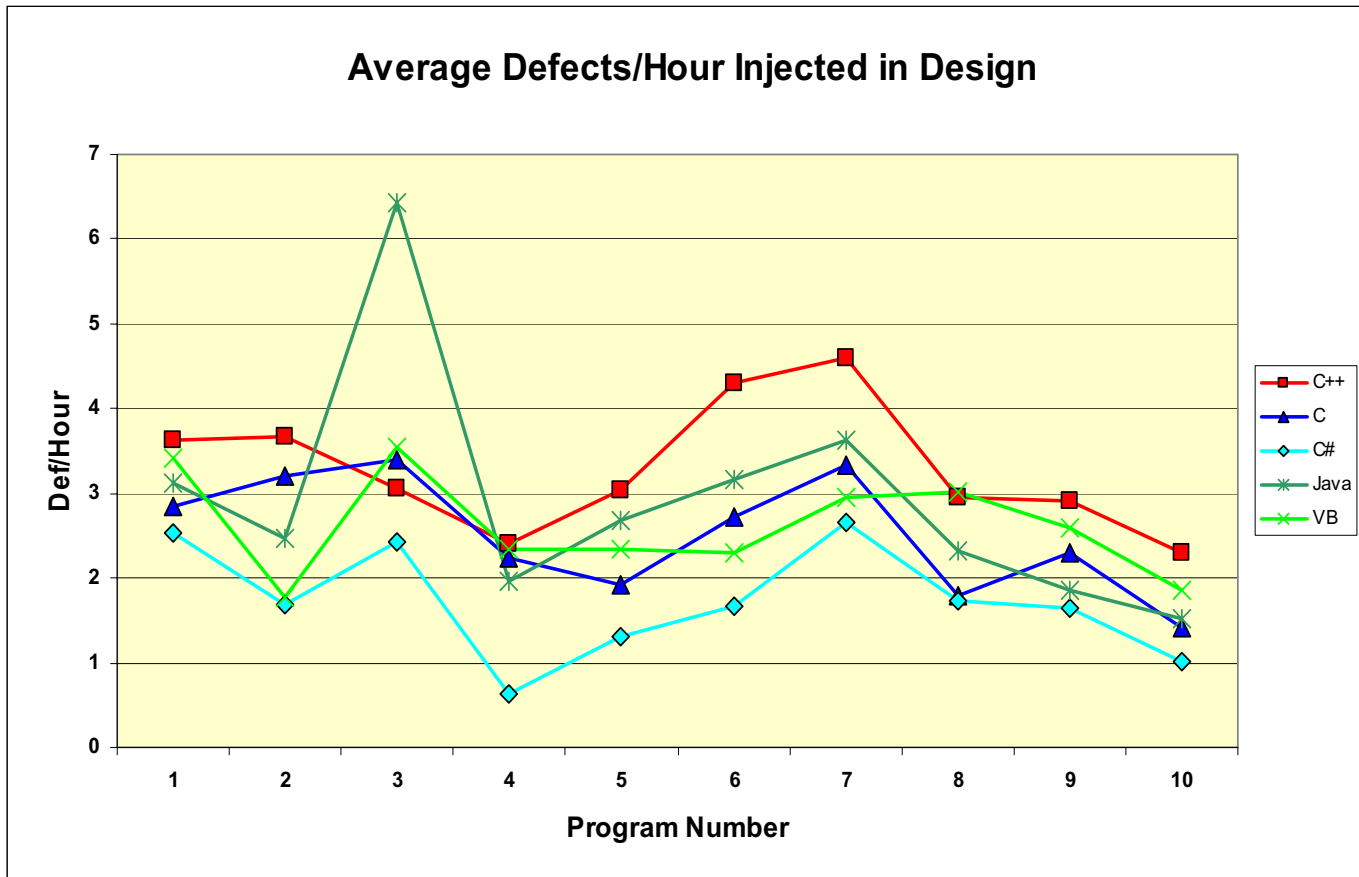


Test Defect Density



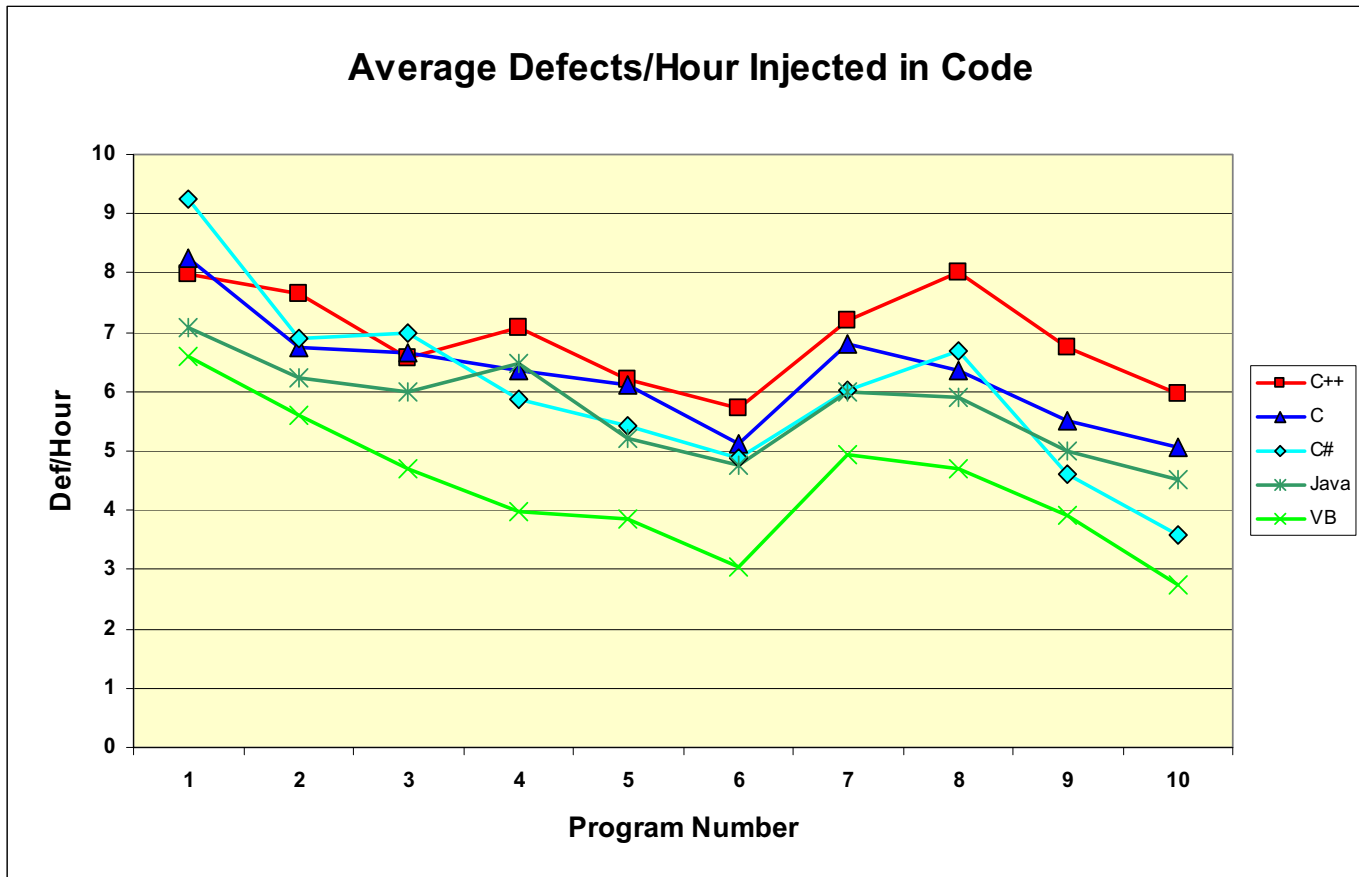


Defects/Hour Injected in Design



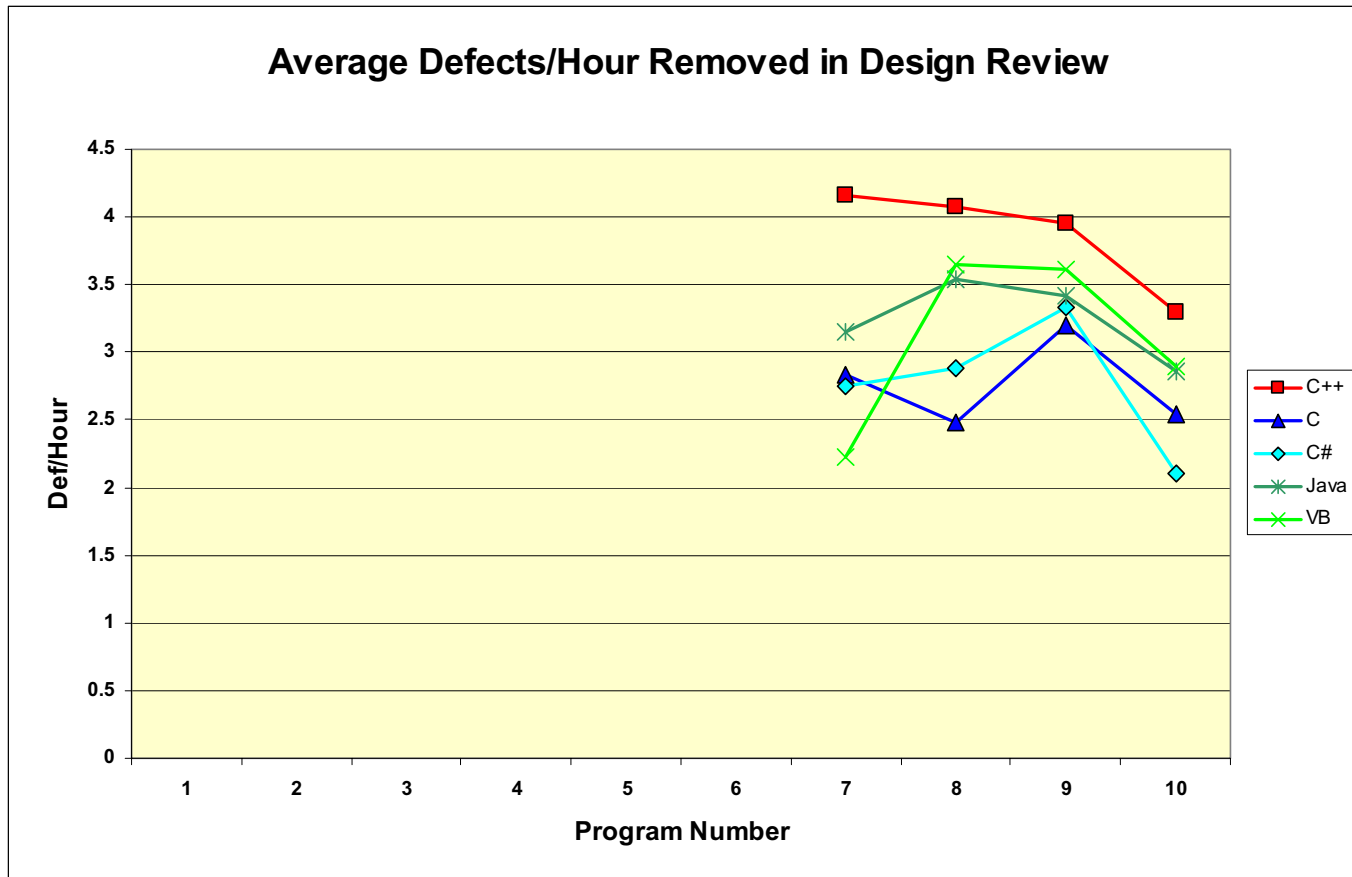


Defects/Hour Injected in Code



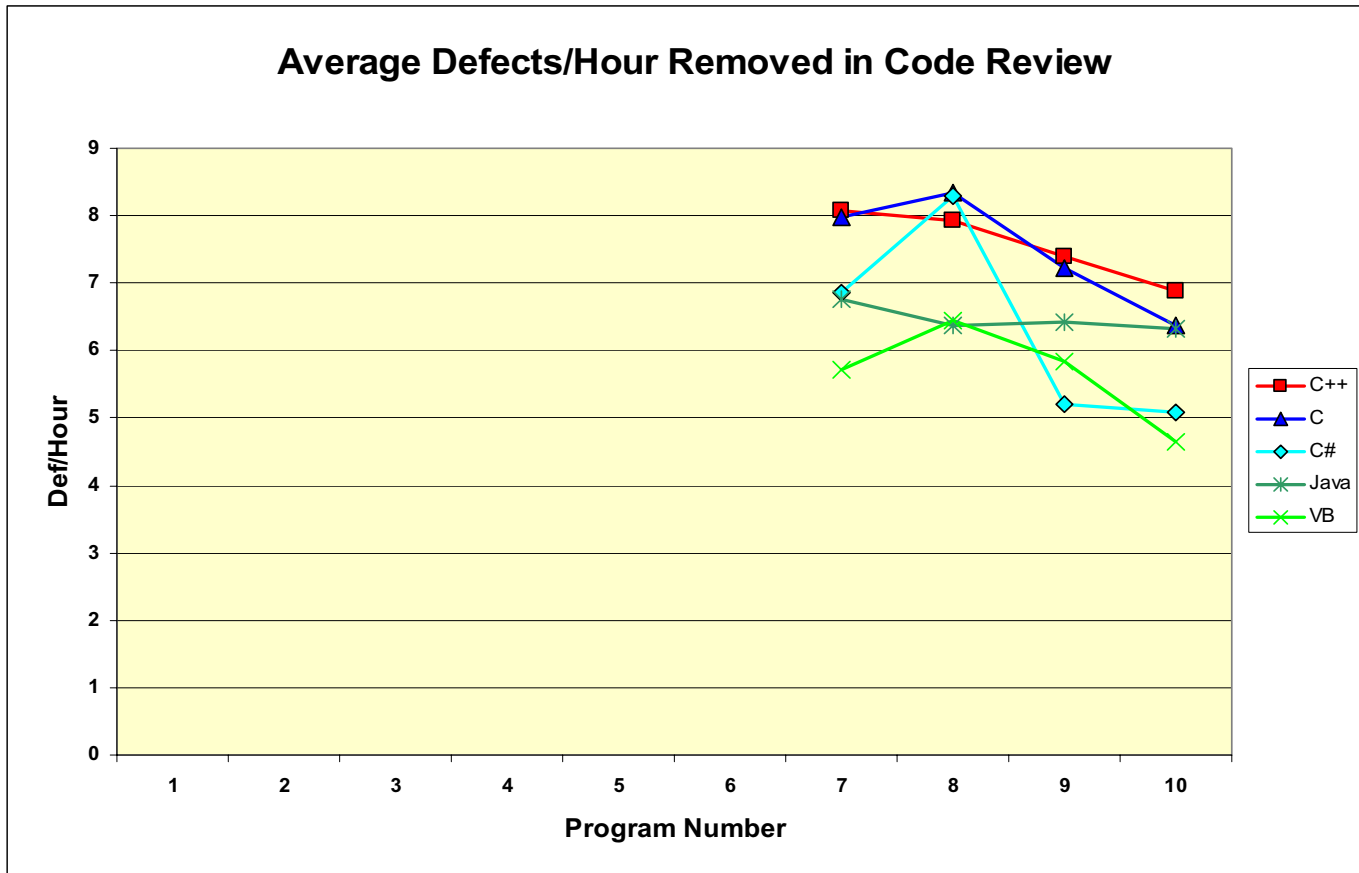


Defects/Hour Removed in Design Review



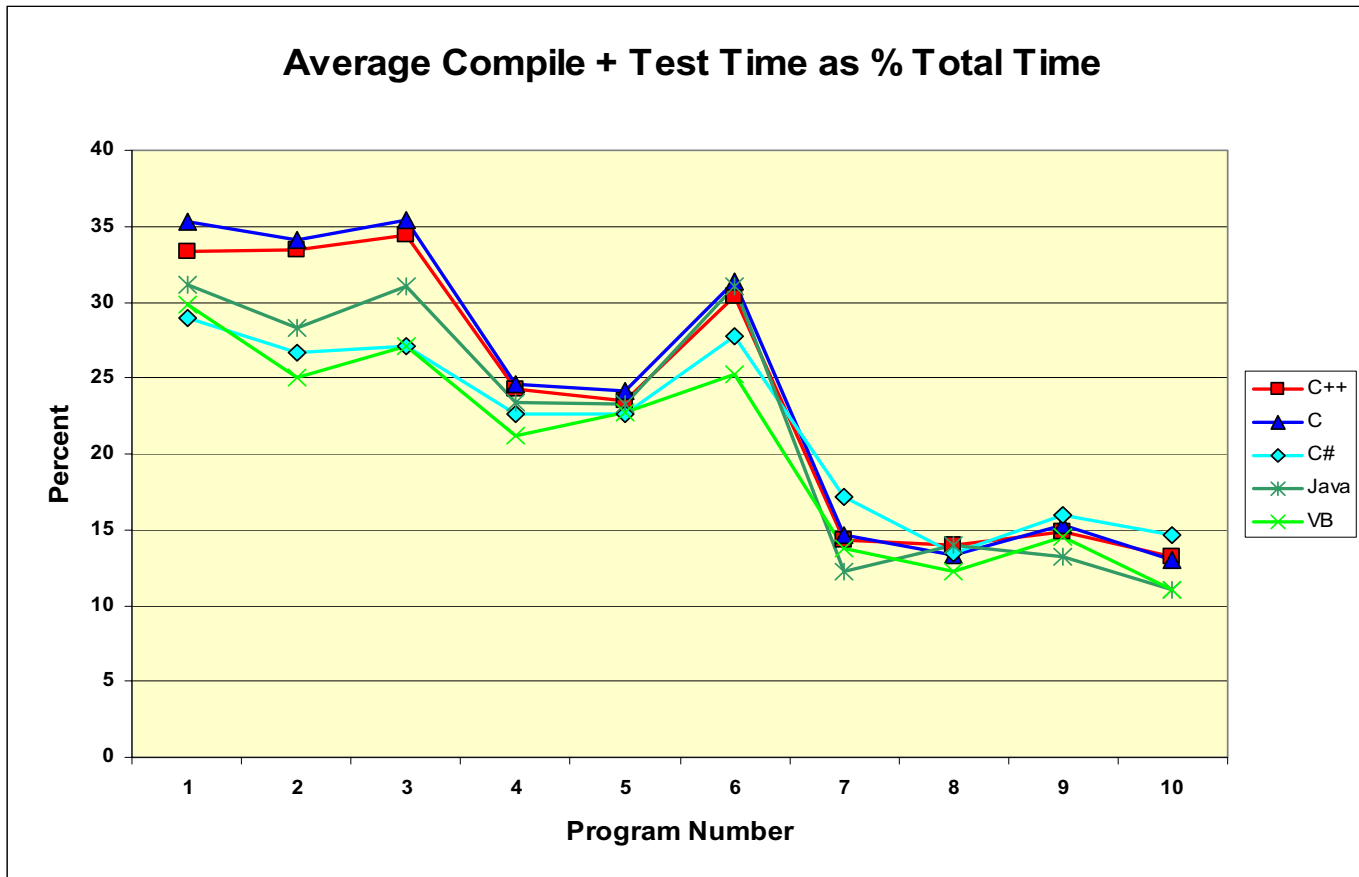


Defects/Hour Removed in Code Review



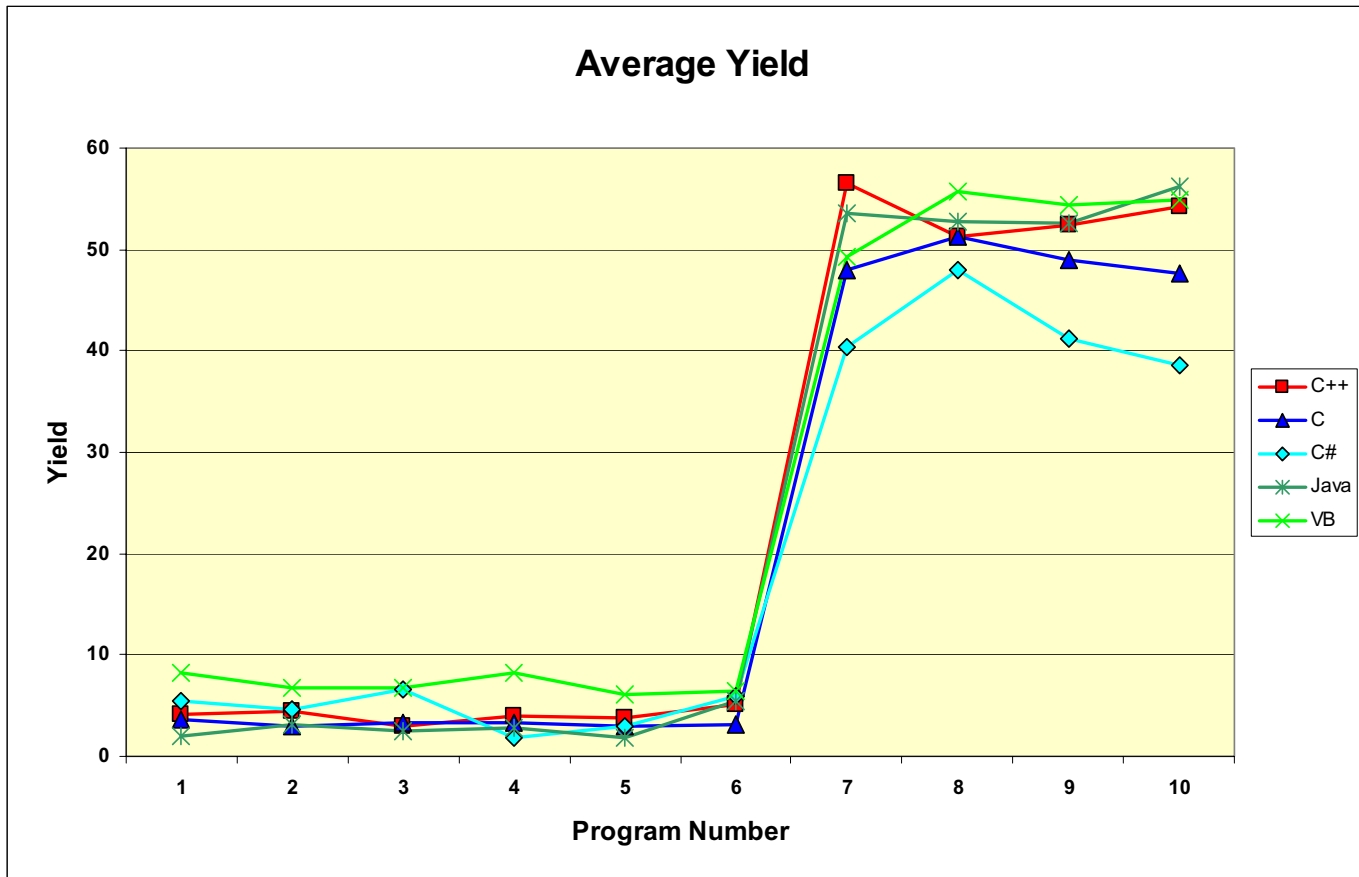


Compile + Test Time as % Total





Yield





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Conclusions

The Personal Software Process (PSP), when properly used provides comprehensive data.

Developers and their teams can use these data to manage their work.

With the aid of PSP data, teams have improved their productivity and shortened development time.

The large volume of PSP data provides a valuable source of information on software engineering practice.



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For More Information

Visit the PSP/TSP web site

<http://www.sei.cmu.edu/tsp>

Contact a TSP transition partner

<http://www.sei.cmu.edu/collaborating/partners/trans.part.psp.html>

Contact SEI customer relations

Phone, voice mail, and on-demand FAX: 412/268-5800

E-mail: customer-relations@sei.cmu.edu

See the books

PSP: A Self-Improvement Process for Software Engineers, by Watts Humphrey, Addison-Wesley, 2005.

Winning with Software, by Watts Humphrey, Addison-Wesley, 2002

TSP: Leading a Development Team, by Watts Humphrey, Addison-Wesley, 2006.

TSP: Coaching Development Teams, by Watts Humphrey, Addison-Wesley, 2006.