

International Software Benchmarking Standards Group

*Practical ways to use project history data to
improve IT project performance*

www.isbsg.org

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ISBSG Repositories

There are three ISBSG repositories of I.T. history data:

1. Software Development & Enhancement project data
2. Maintenance and Support application data
3. Software Package Acquisition and Implementation data (to be released 1st quarter 2007)

ISBSG Data Uses

- Verification of completeness of software requirements
- Early lifecycle estimation of software size, effort and cost
- Early lifecycle estimation check of effort, duration & speed of delivery
- Awareness of project risk, checking the reality of estimates
- Determining an appropriate project team size> Checking project duration
- Planning and monitoring projects
- Acquiring custom-built software based on a price per functional unit.

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ISBSG Data Uses (cont)

- Planning manageable project sizes to achieve on time, on budget delivery
- Balancing project variables eg. rapid delivery against productivity
- Assessing outsourcing options
- Planning development environment components
- Establishing the impact of tools, methodologies and processes
- Benchmarking your project's performance against similar projects, (Post implementation review)

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Definitions

- ISBSG = International Software Benchmarking Standards Group
- FU = Functional Units (eg: Function Points - FP)
- PDR = Project Delivery Rate
= Hours per FP
- PWE = Project Work Effort

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Requirements completeness check

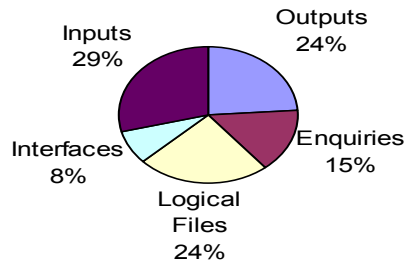
Using Function Point component breakdowns.

- The average functional proportions of the five FP function types have remained relatively stable for a 12 year period.
- You can use these ratios of Inputs, Outputs, Enquiries, Files and Interfaces as a sanity check of the completeness of requirements for your proposed system.

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Checking Requirements completeness

FP component ratios ISBSG Release 9



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Requirements completeness

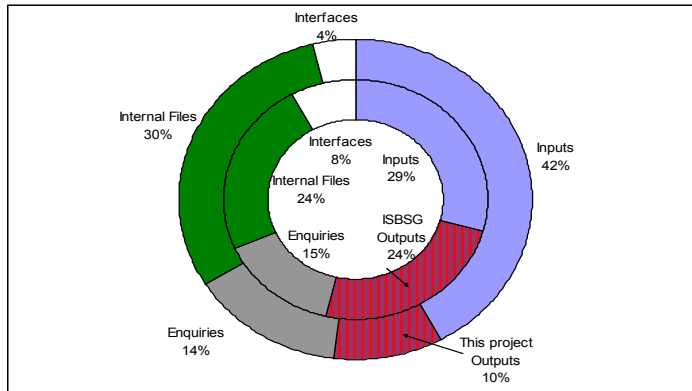
These breakdowns are available for New Developments, Enhancements and Re-developments.

They provide a rough guide to check your project components or checking the completeness of a functional size count. A significant variance may indicate that your components are incomplete or incorrect and a need to investigate.

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Checking completeness of project requirements

Using ISBSG Release 9 Industry Data



From: Practical Project Estimation 2nd Edition:
<http://www.isbsg.org/Isbsg.Nsf/weben/Practical%20Project%20Estimation%20Toolkit>

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Early Estimation of Size, Effort & Cost

Using the same FP ratios as we used to check the completeness of requirements, you can estimate the likely size of a project very early in its lifecycle.

Once you know the likely size you can calculate a rough estimate of effort and subsequently cost.

This is very rough but still useful early in the project lifecycle.

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Quick, early lifecycle estimating

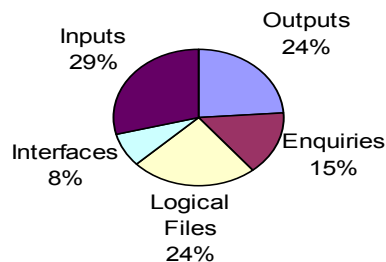
- the three steps

1. Estimate Application Size (FPs)
 - | Count Logical Files (each worth 7 fp)
 - | Extrapolate for total application size (files ~ 25% of total)
2. Estimate Project Work Effort (PWE)
 - | Select median Project Delivery Rate for 'language' (hrs/fp)
 - this should be checked against median PDR for 'application type'
 - | Calculate effort days (or hours)
3. Estimate Developer Cost
 - | multiply PWE (days effort) by Developer estimated daily cost

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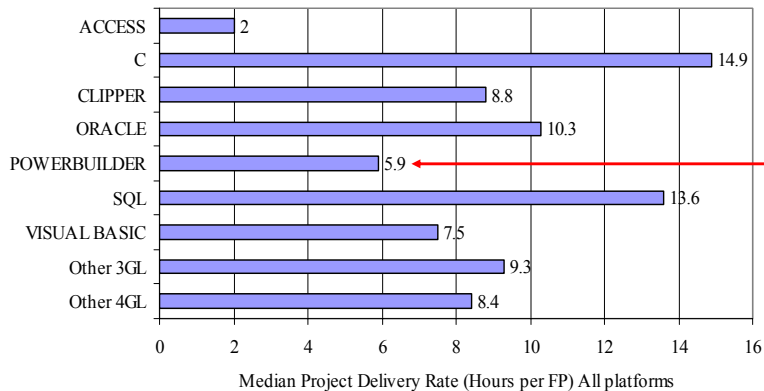
Function Point Breakdown

FP component ratios ISBSG Release 9



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Median Project Delivery Rates



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...as an example

...for a Powerbuilder development with a data model of 40 logical files

1. Application Size = $40 \times 7 = 280 \times 4 = 1,120$ FP
2. Project Work Effort = $1,120 \times 6 = 6,720$ hrs
3. Developer Cost = $6,720 \times \$120 = \$806,400$

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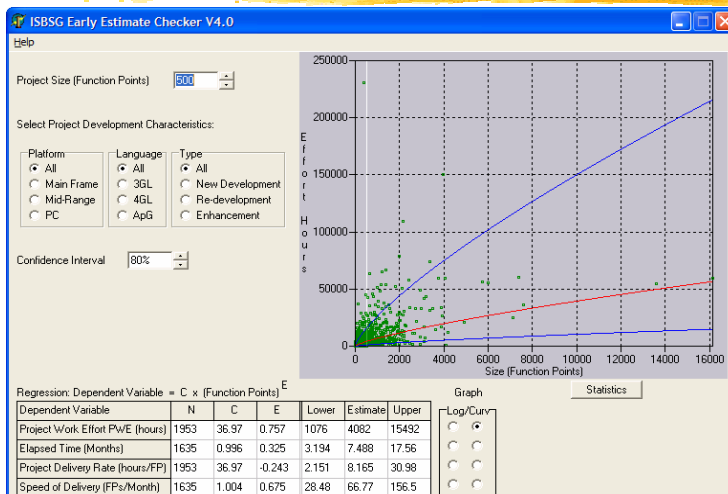
Early Estimation of Effort, Duration & Speed of Delivery

You can use the ISBSG Early Estimate Checker tool to establish an early estimate, or check your first estimate for a project based on its basic characteristics: Platform, Language and Size.

The tool produces an estimate range based on similar projects from the ISBSG history.

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ISBSG Early Estimate Checker



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Checking the Accuracy of Estimates

If you are in a position where you have to approve expenditure on a software development, or put forward a proposal for expenditure approval, then it is important to know the chance of success, (or risk) of the project.

The ISBSG Reality Check is an on-line tool that allows you to quickly compare the proposed project estimates with similar completed projects in the ISBSG repository.

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The ISBSG Reality Check

➤ Purpose

- A quick and low cost method for Project Boards to check that the cost and time expectations for the project are realistic before they commit funds

➤ The 4 Steps

- 1. Determine the application *size* (fp)
- 2. Enter parameters into ISBSG Reality Check Tool
- 3. Conduct a Reality Check on each of 4 dimensions
 - Developer effort (Project Work Effort)
 - Elapsed Time (months)
 - Productivity (Project Delivery Rate Hrs/FP)
 - Speed of Delivery (function points / month)
- 4. Log results and intended actions

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The Reality of Project Success

For example, if the tool reports that only 15% of similar projects in the ISBSG Repository were completed within the estimates that you have for your project, you will have to ask:

Are the estimates for your project realistic?

The ISBSG Reality Check tool is available on line to ISBSG web subscribers:
<http://www.isbsg.org/ISBSG.nsf/weben/Subscribe>

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Determining an appropriate Team Size

For small teams the ISBSG data reveals that there is a simple relationship between project size and team size:

- Teams of 4 developers, the output range is 60 to 100 FPs per staff member.
- Teams of 10 or more, the range is 20 to 50 FPs per staff member.

From: The Software Metrics Compendium book:
<http://www.isbsg.org/Isbsg.Nsf/weben/The%20Software%20Metrics%20Compendium>

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Checking Project Duration

There are some "natural" durations for ranges of project size and effort, confirming that there is a limit to how far you can reduce duration by adding staff.

The Compendium book provides a detailed tables of durations for different project sizes and effort.

Effort Hours	Duration Mths	Av. Mths
100 - 800	1 to 8	
800 - 2000	3 to 7	5
2000 - 3200	4 to 9	7
3200 - 20000	8 to 12	10
> 20000	>14	24

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Planning and Monitoring Projects

Known ratios of work effort phases, (Plan, Spec, Build, Test, Implement), can be used to help you plan your project and then monitor it.

Lifecycle phase breakdowns are available for:

- New Developments
- Re-developments
- Enhancements

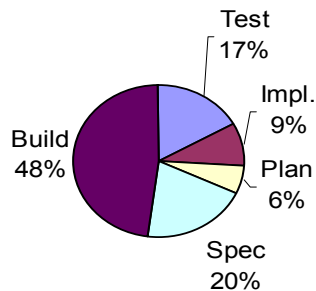
From: The Software Metrics Compendium book:

<http://www.isbsg.org/Isbsg.Nsf/weben/The%20Software%20Metrics%20Compendium>

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Work Effort Breakdown – New Developments

From the Software Metrics Compendium



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Acquiring Software on price per Function Point

The State of Victoria in Australia has developed a methodology called *southernSCOPE*. This methodology is in the public domain and can be used to acquire software development on a cost per delivered Function point basis.

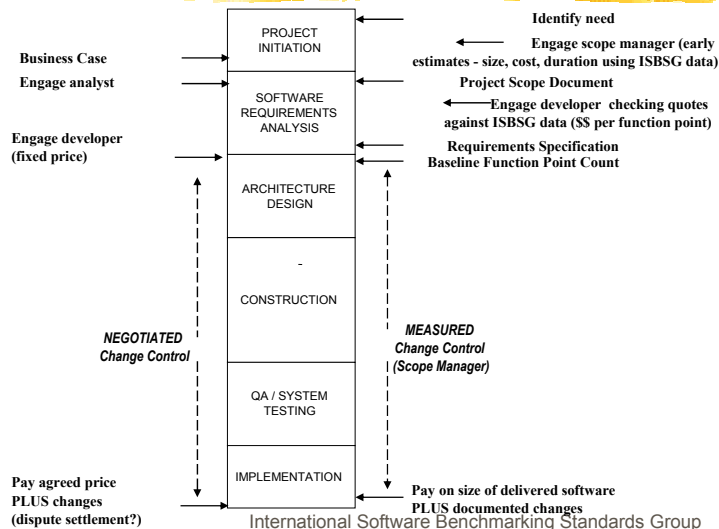
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southernSCOPE...where it came from

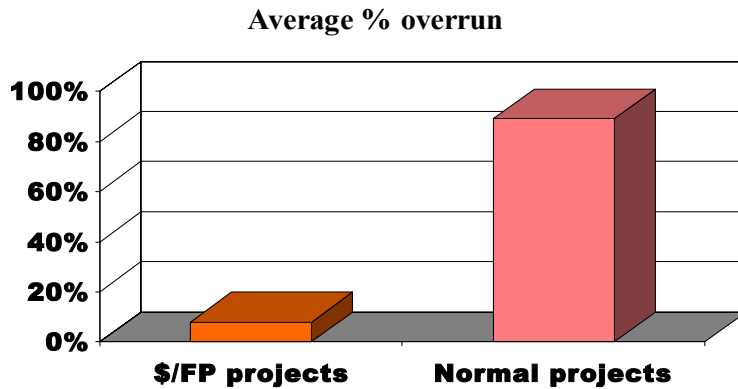
- Victorian Government spends A\$50m pa on custom-built software
- It developed the southernSCOPE methodology and draft policy in 1996
- southernSCOPE has since been adopted in Europe and Japan
- In mid-2000 a review was conducted to establish whether the approach had been successful

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Traditional approach V. southernSCOPE



It controlled budget over-runs



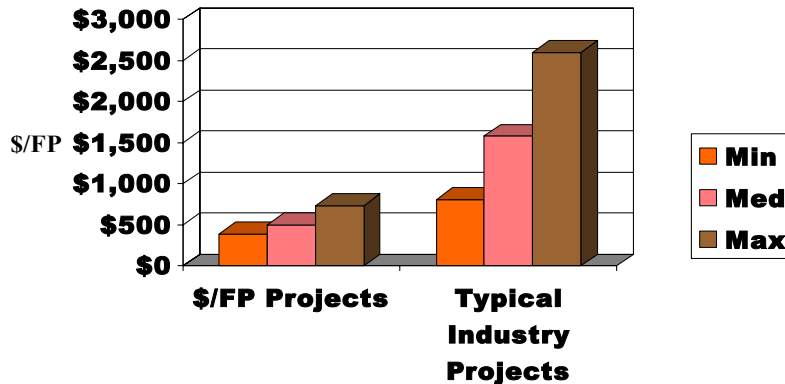
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southernSCOPE projects met the primary business objectives

- The projects were good at delivering software which met the primary business objectives.
- The projects achieved all important requirements.

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Delivered value for money



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Why did *southernSCOPE* projects succeed?

Almost all of the most common causes for software project budget overruns were removed:

- ~~Lack of user input~~
- ~~Incomplete requirements~~
- ~~Changing requirements~~
- Lack of executive support
- ~~Technology incompetence~~
- ~~Unrealistic expectations~~

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southernSCOPE increased certainty for business

- the project **will be completed**
- it will be **within budget**
- the functionality provided **will meet business objectives**
- good **value-for-money**

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Public Domain Documentation - southernSCOPE

www.egov.vic.gov.au/pdfs/southerSCOPE_001221.pdf

- Reference Manual
 - with sample advert, Project Reqs Spec and Contract
- Awareness Brochure (for project sponsors)
- Case Studies
- Powerpoint presentation (for project sponsors)
- Computer Based Training Package (2 hour)
- Training Course for Developers and Sponsors
 - "Working Under southernSCOPE"

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Benchmarking your project's performance

The ISBSG offers a free two page project benchmark report when you submit your project for inclusion in the ISBSG repository.

Your project is compared to similar projects in the ISBSG repository. Hours per Functional Unit (eg. FP) and Defect Occurrence are compared.

This can form a useful part of your post-implementation review.

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Project Benchmark Report

The Project Benchmark Report is a two page report that includes a chart like this example, "your" project's hours per FP are shown in bold:

Influencing Factor	N	P10 %	P25 %	Median		P75 %		P90 %
Development Platform: Mid-range	152	2.4	6.7	8.9	10	11.8		12.4
Language Type: 4GL	201	2.7	5.3	7.2		9.9	10	14.3
Team Size: >8	112	4.5	7.6	9.1	10	19.3		23.4

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Conclusion



The ISBSG data and services provide many practical ways to improve the quality of your software and improve the management of IT resources.