II Conferencia Internacional Encuentro ISBSG-AEMES
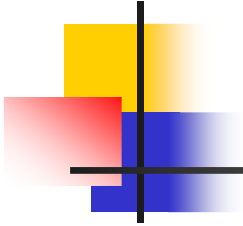VI Conferencia Anual de la Asociación Española de Métricas de Sistemas Informáticos   2005

Why development team size and platform influence software project productivity and delivery

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There are 3 main project characteristics that effect the performance of a software development:

- Development Platform
- Development Language
- Development Team Size

Why Platform?

The development platform (hardware) does not of itself make a difference.

The environment attached to the type of development platform makes the difference.

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Platform differences

There are two likely reasons for the development platform productivity differences:

1. The development process
2. The business environment

Mainframe

More business units involved, larger number of users, more locations, likely to use a "formal" methodology.

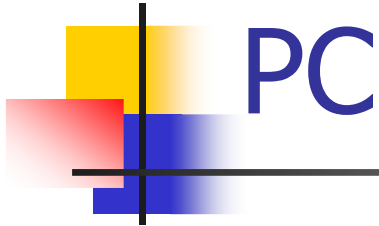More communication needed, more documentation, more management.

More Effort !

Mid-range

- Fewer or single business unit involved, less users, less formal methodology.

- Smaller development team

Less Effort !

PC

- Infrequent use of methodologies or in-house written methodology
- One or two person teams
- One or few users involved

Much Less Effort

Consider your environment

- What process/methodology will be used – formal detailed, lots of documents etc?

- What communication effort is required – client, business units, stakeholders and team.

Adjust your estimate accordingly

Project delivery rate - platform

Hours per function point

Platform	N	Median	Mean
Mainframe	503	11.9	16.8
Mid-range	141	10.3	14.1
PC	227	7.1	10.2
Multi	293	6.9	10.7

Languages

Programming languages and language types have different levels of productivity.

When estimating take your language or language type into consideration.

Project Delivery Rate - Language Type

Hours per function point

Platform	N	Median	Mean
3rd generation language	812	11.2	16.9
4th generation language	667	8.3	12.9
Application generator	31	7.4	8.8

Platform & Language

Hours per function point

Platform	Lang	N	Median	Mean
MF	3GL	382	15.77	20.03
MF	4GL	94	7.35	11.13
MF	ApG	10	6.78	9.38
MR	3GL	75	9.30	14.51
MR	4GL	62	11.26	13.84
MR	ApG	0	N/A	N/A
PC	3GL	87	8.21	13.14
PC	4GL	129	6.04	8.96
PC	ApG	2	N/A	N/A

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Project Delivery Rate Tables

The ISBSG provides tables of the various project delivery rates for:

- Platforms

- Languages

- Platform & Language combinations

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Team Size

Once development platform and language have been considered then team size is the next most significant characteristic that impacts productivity.

Software Teams

Team work is important

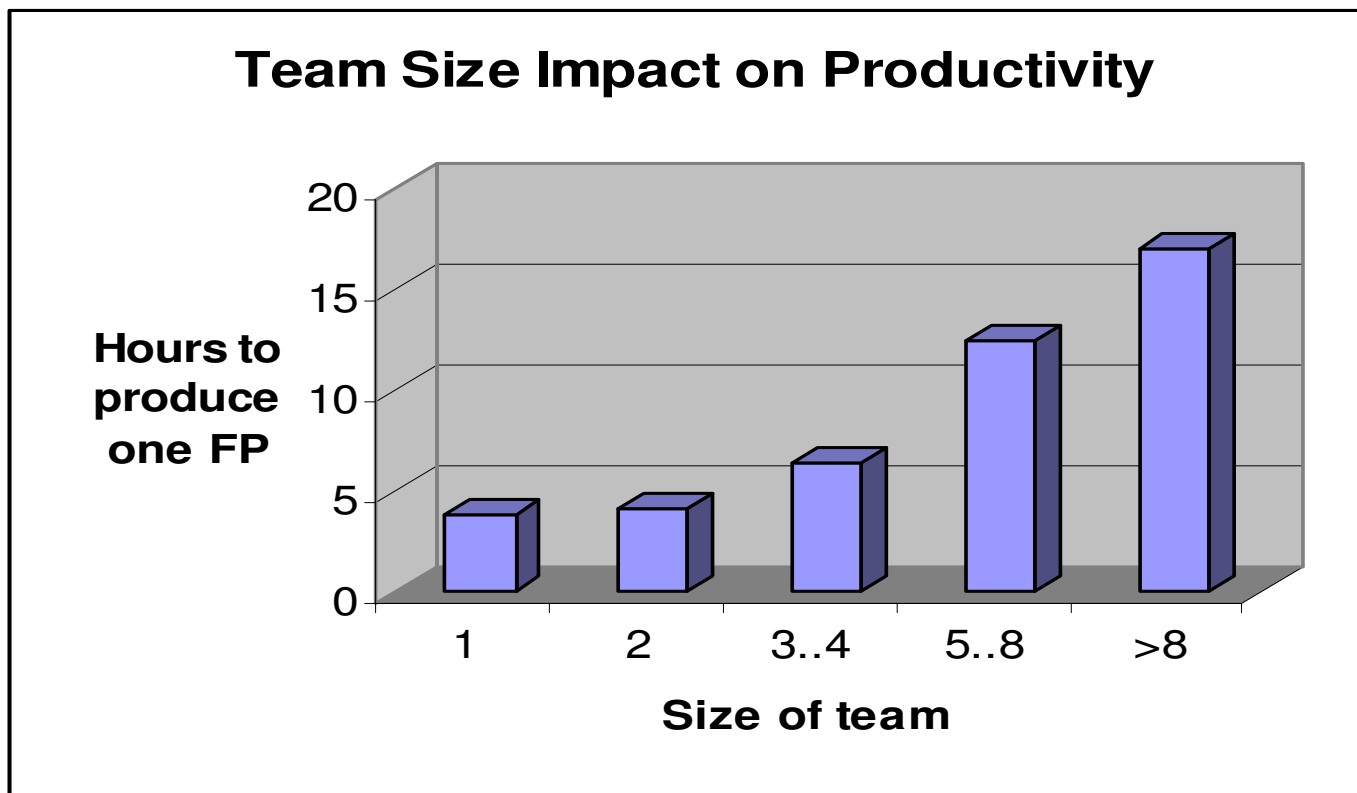**Large teams are more difficult to manage and communication is usually more time consuming**

Teams of less than 5 give good productivity
Teams of 9 or more are significantly less productive

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Team Size & Productivity

Across all platforms

Team Size Impact on Productivity

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Team Size

Team size impacts the productivity rate of a project because as the size of the team increases, communication becomes more difficult and more management, support & administration are needed.

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Team size

The ISBSG uses "Maximum Team Size"

The maximum number of people that worked at any time on the project (peak team size)

Effect of Team Size

Once you have established the project delivery rate that you can expect from your platform and language combination then you can adjust this for the effect that your team size will have.

Effect of Team Size

Adjustment table: add or subtract hours per function point.

Max Team Size	N	Median	Mean
1 to 4	116	-4.5	-3.2
5 to 8	108	-1.3	-0.1
9 or more	90	+1.9	+4.3

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Example

From the Platform/Language Type table:

Mainframe & 3GL = ~14.8hrs per fp

For a team size <5 subtract 4.5hrs per fp

= ~10.5hrs per fp

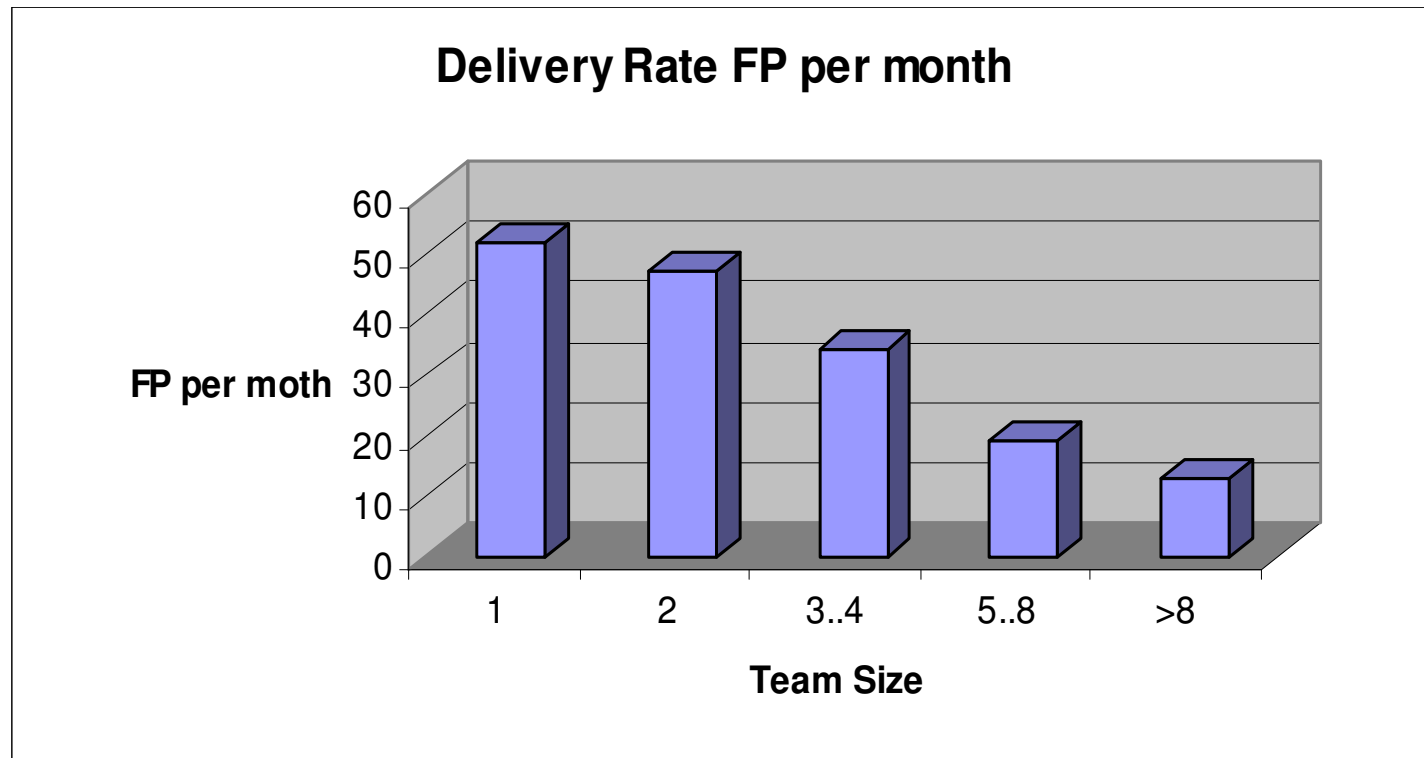For a team size of 9 or more add 1.9 hrs per fp = ~ 16.7 hrs per fp

Caution!

- This is a guide only.

- The figures are approximate.

- Always use a range for your estimates.

- You must adjust any estimate using your knowledge of your company, the project, your team etc.

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Team Size & Duration

Team size impacts duration:

Delivery Rate FP per month

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Team Size & Project Size

Small teams have a simple relationship between project size and team size.

A typical load for a developer is approximately 100 to 140 function points.

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Team Size & Project Size

The average number of function points per staff member declines as teams get bigger:

- In teams of 4, the average is 60 to 100 function points per staff member

- In teams of 5 to 9 members, the average is 35 to 70 function points per staff member

- In teams of 10 or more, the average is 20 to 50 function points per staff member.

Summary

- Platform and language are important influences on productivity.

- Team size has an impact - particularly the negative impact of larger teams.

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