

Exploring the Relation Between Effort and Duration in Software Engineering Projects

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Presented at

**World Computer Congress 2000
Beijing, Popular Republic of China**

August 21-25, 2000

Agenda...

- ◉ **Context**
- ◉ **Description of the data sample**
- ◉ **Building project duration models**
- ◉ **Models analysis**
- ◉ **Conclusion**

Context...

- ⊙ In spite of the work done on this topic in the past, existing duration models are often based on small empirical samples.
- ⊙ This confirmatory study is characterized by:
 - ⊙ The use of a large and internationally recognized data sample,
 - ⊙ The perspective of a “first order” estimation of duration,
 - ⊙ A consideration for the project development platform,

Description of the data sample...

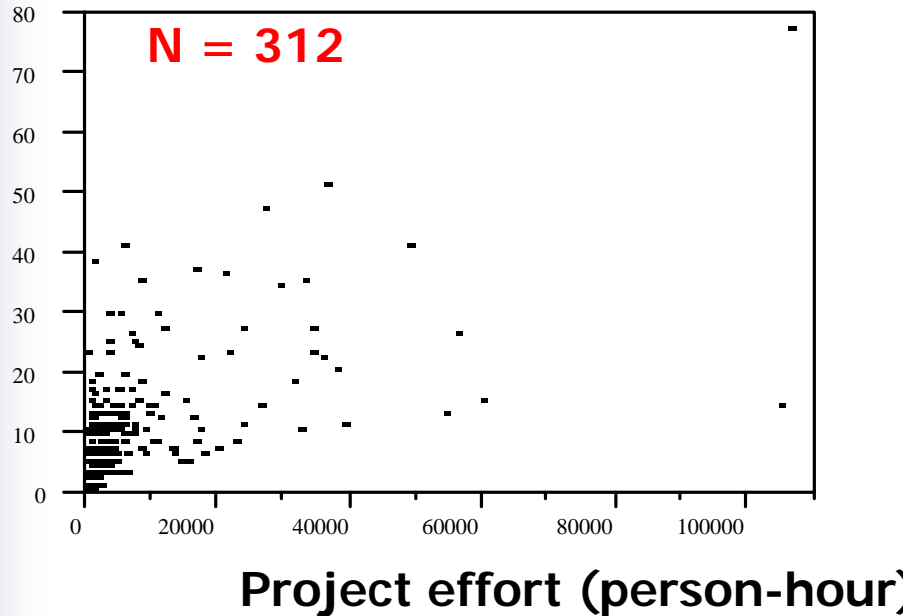
- ⊙ **Data source: International Software Benchmarking Standard Group (ISBSG),**
- ⊙ **Representing 396 software projects,**
- ⊙ **Out of which 312 for which project effort, duration and development platform are known,**

	Project duration (months)	Project effort (person-hour)
Number of obs. (N)	312	312
Minimum value	1	10
Maximum value	78	106 480
Mean value	10,5	5 933
Standard deviation	9,0	12 169
Median	8,0	2 228

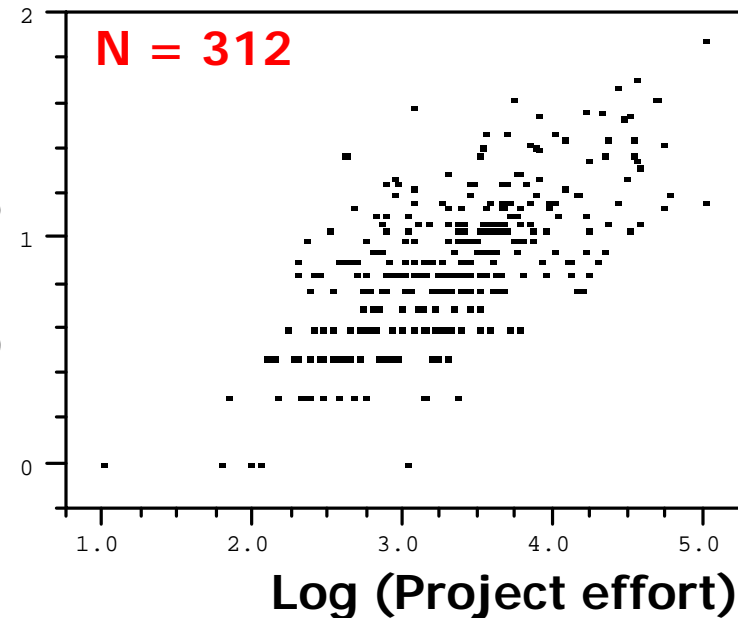
Description of the data sample...

- ⊙ A first look at duration and effort:

Project duration (months)



Log (Project duration)



Building duration models...

- ◉ **Separate models built for:**
 - ◉ **Mainframe development platform (MF),**
 - ◉ **Mid-range development platform (MR),**
 - ◉ **Personal computer development platform (PC),**
- ◉ **Linear regression models:**
 - ◉ **Independent variable: project effort,**
 - ◉ **Dependent variable: project duration,**

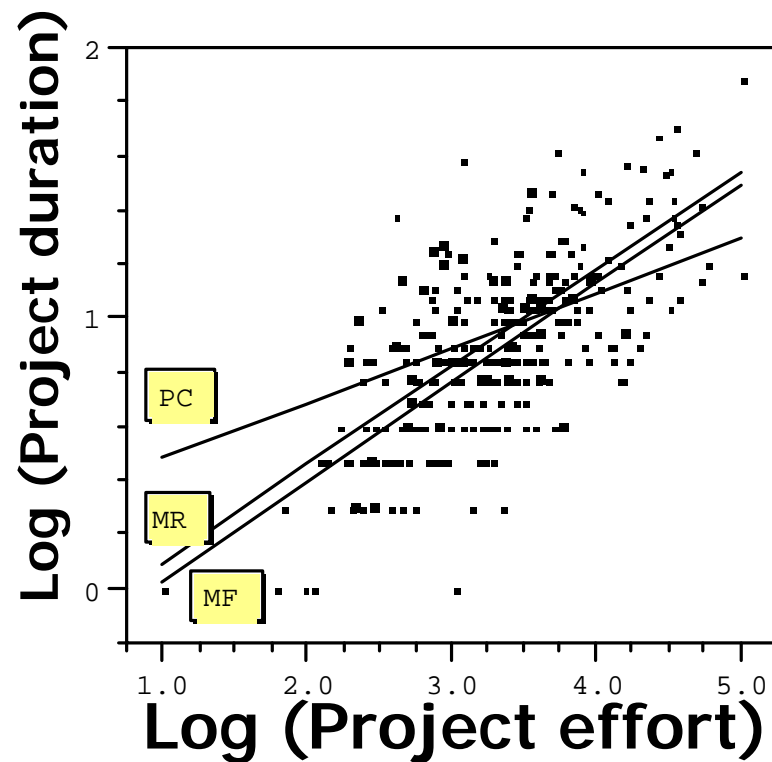
Building duration models...

- Modeling results:

	MR platform	PC platform	MF platform
N	65	39	208
R ²	0,434	0,140	0,522
F (1, (N-1))	48,324	5,970	224,865
Prob. > F	0,0001	0,0194	0,0001
Log (effort) coefficient	0,360	0,201	0,366
Std. Error of Log (effort)	0,052	0,082	0,024
Constant	- 0,261	0,287	- 0,339

Building duration models...

- Modeling results:



Building duration models...

- ⊙ Models equations (multiplicative form):

For MF projects: $D = 0,458 * E^{0,366}$

For MR projects: $D = 0,548 * E^{0,360}$

For PC projects: $D = 1,936 * E^{0,201}$

- ⊙ Where “D” is the project duration, in months, and “E” is the project effort, in person-hours.

Models analysis...

- ⊙ **Is there a significant difference between these models ?**
- ⊙ **A Student's "t-test" was performed under the hypotheses that there was no differences between the three models.**
- ⊙ **Results show that, at the 95% level, MF and MR models do not differ significantly while the PC model display a significant difference from both the MF and MR models.**

Conclusion...

- ⊙ This study confirm the usefulness, in conjunction with other planning tools, of modeling project duration using project effort as an independent variable.
- ⊙ The relationship between effort and duration is:
 - ⊙ exponential rather than linear,
 - ⊙ the exponential term is (0,3 to 0,4 range) is comparable to previous work on this topic,
- ⊙ The relationship between effort and duration can differ depending on the development platform.

Acknowledgments

- ◉ **The Software Engineering Management Research Laboratory of the Université du Québec à Montréal is supported through a partnership with Bell Canada.**
- ◉ **Additional funding is provided by the Government of Canada.**