



Estimating Tester to Developer Ratios (or Not)

Kathy Iberle (Hewlett-Packard)

Sue Bartlett (IIS/STEP Technology)



Introduction

- Estimating with minimal data
- Can ratios be used?
- A correction method for estimates made using tester-developer ratios



How Many Testers Do I need?

- The traditional way to estimate
 - Project information -> Work breakdown
 - Work breakdown -> Tester hours
- Estimates with less information
 - Minimal project information -> Rules of thumb
 - Rules of thumb -> Tester hours



When Accuracy is not Critical

In the authors' experience, estimates with 20% or more error are useful for:

- Long-term staffing predictions
 - 12-24 months out
 - The projects to be tested aren't defined yet
- Bidding on a large number of small projects
 - Errors tend to cancel each other out
 - A fast bid process wins business



Estimating with Minimal Data

Extrapolation is commonly used

Past Project

- # Developers
- # Testers
- # Test Hours
- Code Size
- Function Points

Current Project

- # Developers
- ??
- ??
- Predicted code size
- Predicted function points



Extrapolation uses Ratios

Past

KLOC/test hours =

Fn pts/testers =

Testers/developers =

Future

KLOC/test hours

Fn pts/testers

Testers/developers

Possibly faulty assumptions:

- There is a linear relationship.
- The measurements are repeatable.

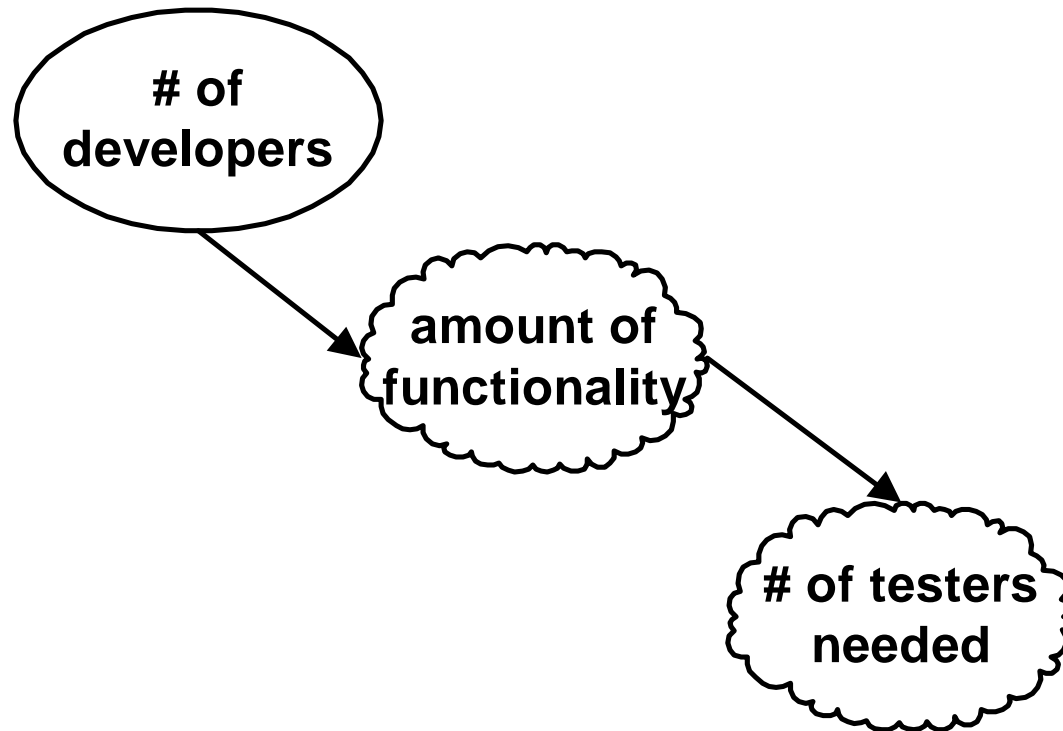


Tester/Developer Ratios

- The relationship isn't demonstrably linear
 - seems to approximate linearity over some ranges
- Measurements of the number of people are not very repeatable
- Definitely not repeatable between organizations
- Other factors affect the relationship



If a Ratio was Really True...





What Most People Do...

- Get the best previous data available
- Try to use the same measurement methods to measure the current data
 - Use your own data, not someone else's
- Extrapolate using a ratio
- Correct the estimate based on their experience



Yet Another Way to Correct

- A systematic correction using a cause-effect model
- Covers a lot of the common factors that cause differences
- Supplies some mental tools to think about “canceling out”



Where did the model come from

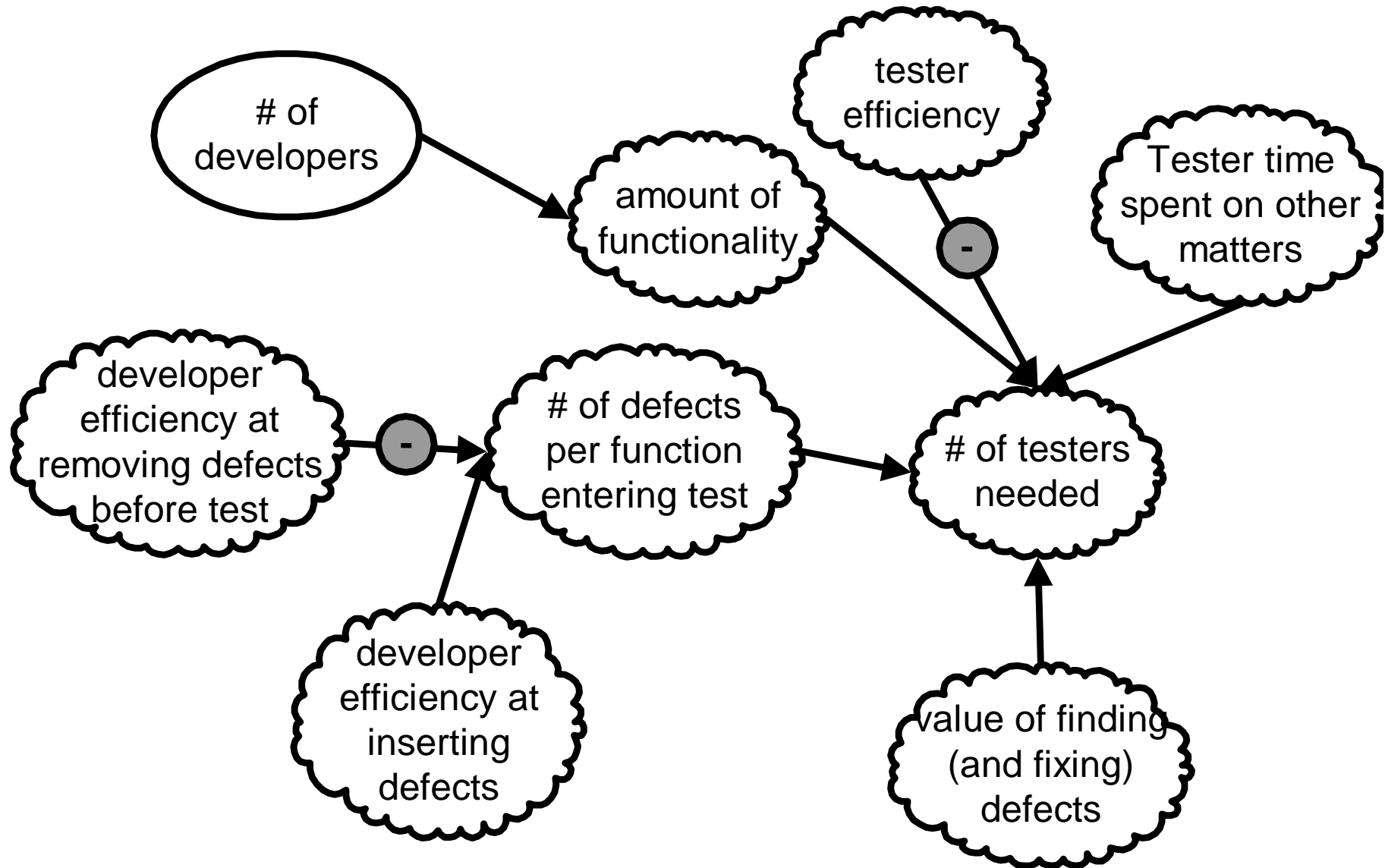
- This model is based on work done at STMR 3 in Oct 2000 by 14 test lab managers and consultants
 - Brainstormed factors that affect the ratio of testers to developers
 - Based on personal observation
 - Relative, not absolute
- The authors sorted and grouped the factors to produce this model



Why use a model?

- We think this models what we do by “intuition” or “experience”
- The systematic model might be more accurate than “intuition”
- An explicit model encourages better thinking
- We incorporate the experience of others into the model, increasing accuracy

Cause-Effect Diagram





The Factors

- 85 different factors listed in the paper
- Top-level groups form cause-effect model:
 - Tester efficiency
 - Developer efficiency at inserting defects
 - Developer efficiency at removing defects
 - Value of defects found
 - Tester time spend on other matters
- Subgroupings by
 - People, Organization, Product, Process
- Other authors organize differently



The Method

1. Choose a baseline project or projects.
2. Collect data on the tester-developer ratio.
3. Collect data on the various effects shown in the diagram.
4. Use the ratio from step #2 to make an initial estimate of the number of testers.



The Method, part 2

4. For each effect bubble, compare the factors that are different between the two projects.
5. Combine the results of the various differences.
6. Adjust the number of testers up or down accordingly.



Demonstration of the Method

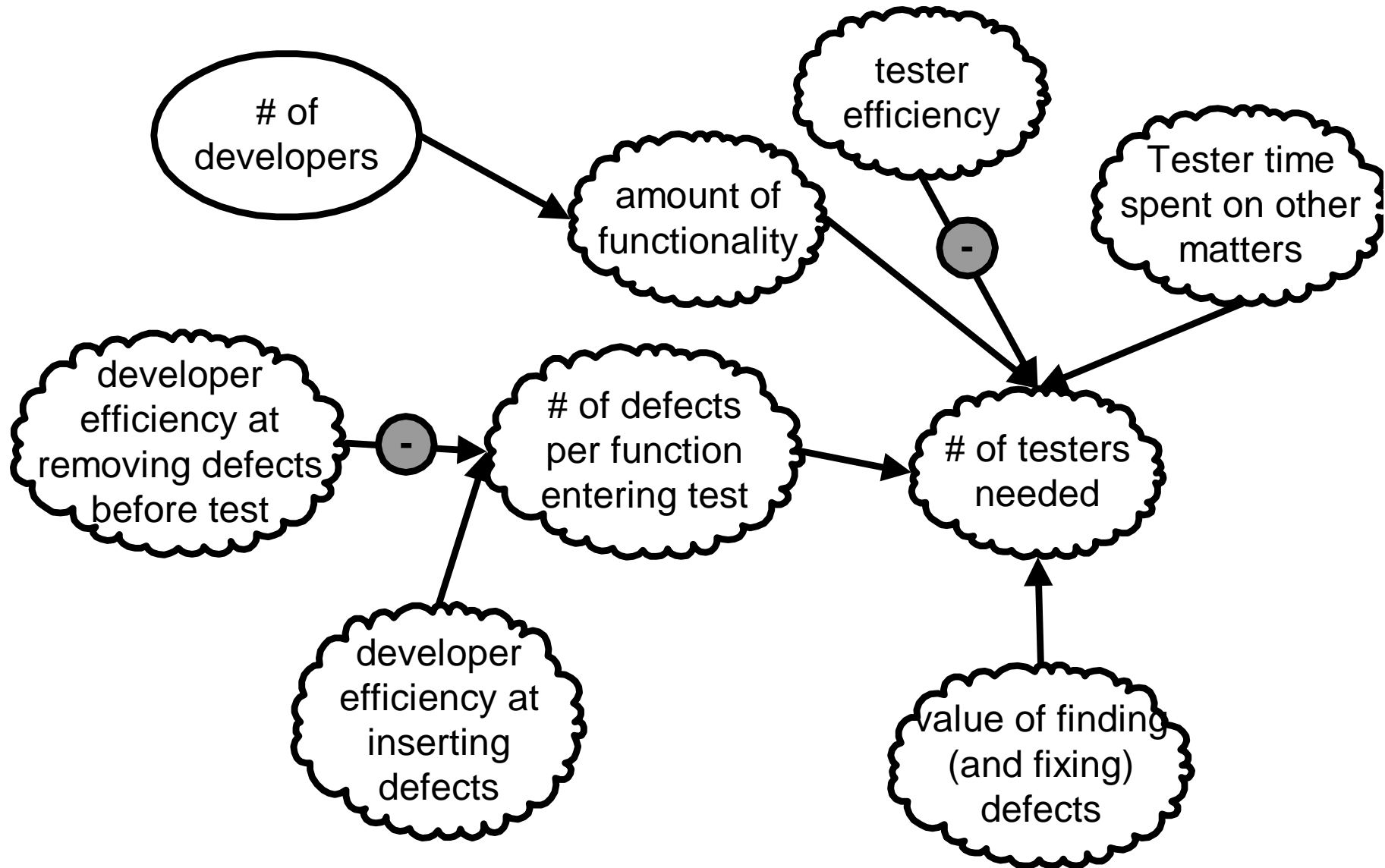
- “MergoApp” is a e-commerce website
 - This will be our baseline project
 - Tester-developer ratio was 1:4
- “DataApp” is a database application to replace an Excel application
 - There will be 8 developers
 - Initial estimate of testers: 2



Correcting the Estimate

- Review the differences between MergoApp and DataApp
- For each bubble in the cause-effect diagram
 - consider whether the effect is larger or smaller than it was for MergoApp
 - Mark bubble with a "+" or "-"
 - Propagate along the arrows
- Let's try it...

Estimation Worksheet





Results

- What estimate do we have now?
 - The initial estimate was 2 testers.
- In the paper:
 - Comparing DataApp with MergoApp suggests that # testers $\gg 2$
 - Comparing DataApp with DinkyApp suggests that # testers $\ll 8$
- The margin of error is pretty large
 - The observed result on DataApp was 4



What Will Happen If You Try?

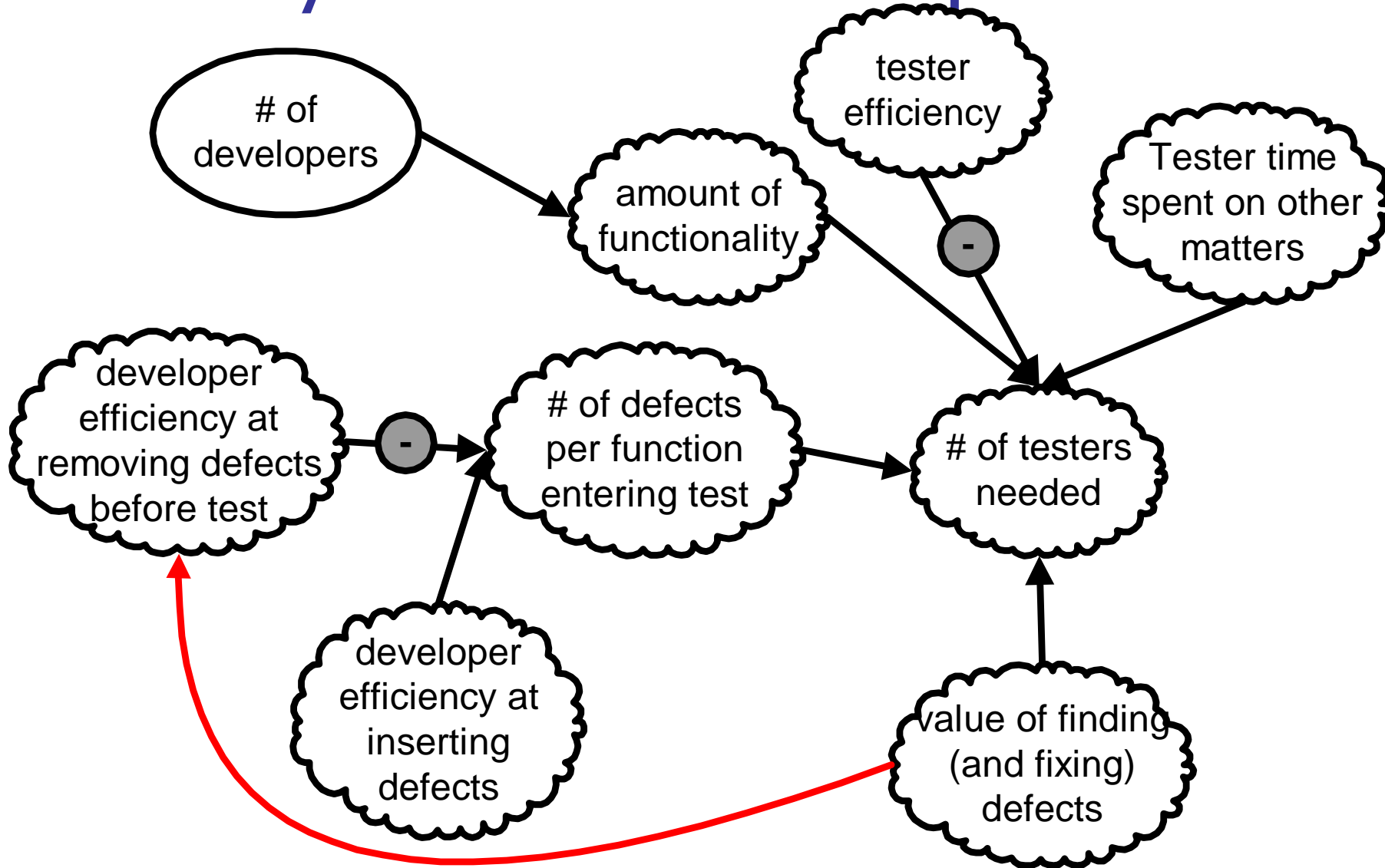
- We tested the model on ~ 4 projects
- Margin of error was about 50%
- Using two baselines, margin of error was obvious (this is good)
- Estimates always need real-time corrections during the project
- If you try this, we'd like to hear whether it worked



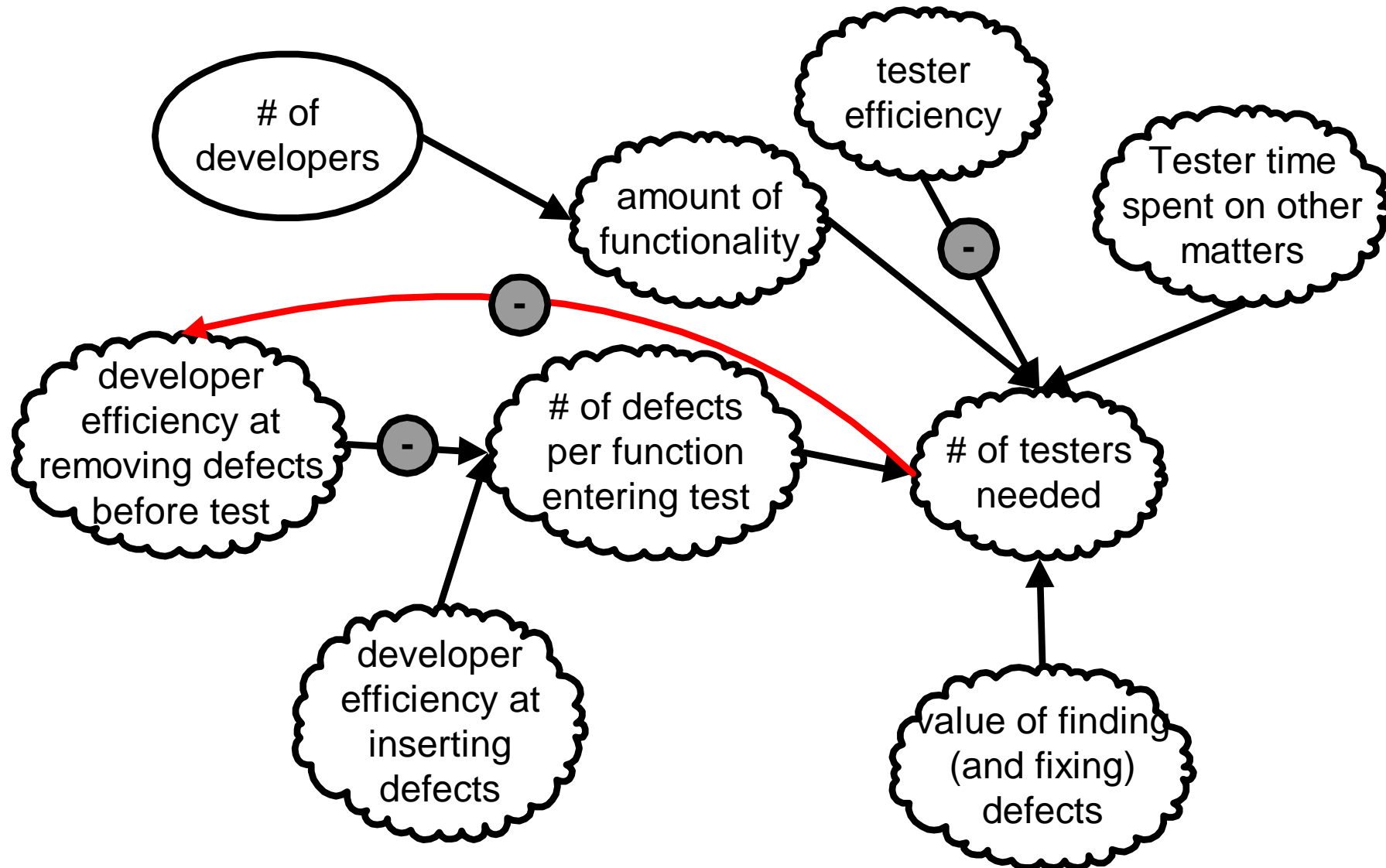
More Handy Uses for the Cause-Effect Diagram

- Illustrate the lack of accuracy in your estimates
 - Walk your management through part of the estimation-upon-estimation process
- Explain your intuitive judgements
- Predict the effect of changes
 - Demonstrate why the change should reduce or increase the number of testers

Very Careful Developers



Too Many Testers???





Summary

- Ratios are used to estimate with minimal data
- The estimates will need to be corrected for the effect of various factors
- The cause-effect diagram is useful for reasoning about those corrections



More information

- A list of factors to use with the model appears in our paper
- A Visio version of the cause-effect diagram is on the CD
- Also posted at www.kiberle.com



References

- Effects diagrams

- G.M. Weinberg, *Quality Software Management, Vol. 1: Systems Thinking*. (New York: Dorset House Publishing, 1992).

- Other papers about estimates

- Johanna Rothman, "It Depends: Deciding on the Correct Ratio of Developers to Testers".
<http://www.jrothman.com/Papers/ItDepends.html>.
- Kaner, Hendrickson, and Brock, "Managing the Proportion of Testers to (Other) Developers". Quality Week 2001 Proceedings.
- Elisabeth Hendrickson, "Better Testing, Worse Quality?". SM/ASM 2001. www.QualityTree.com.