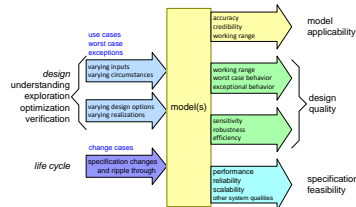


Modeling and Analysis: Analysis

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Abstract

Models only get value when they are actively used. We will focus in this presentation on analysis aspects: accuracy, credibility, sensitivity, efficiency, robustness, reliability and scalability.

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1 Introduction

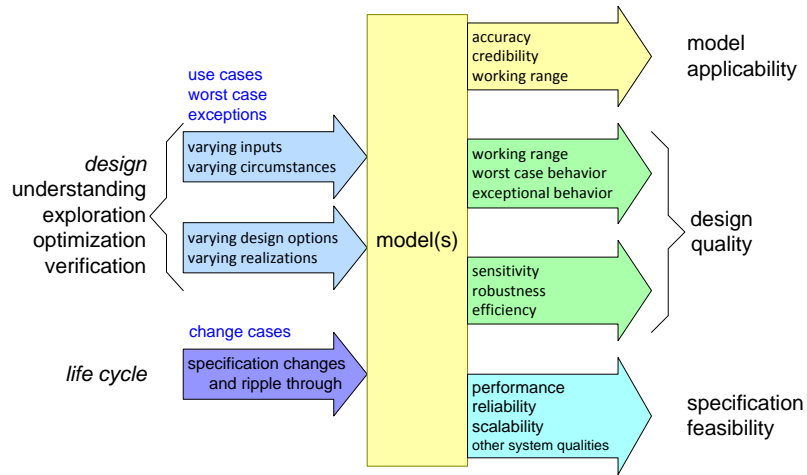


Figure 1: What Comes out of a Model

2 Model Applicability

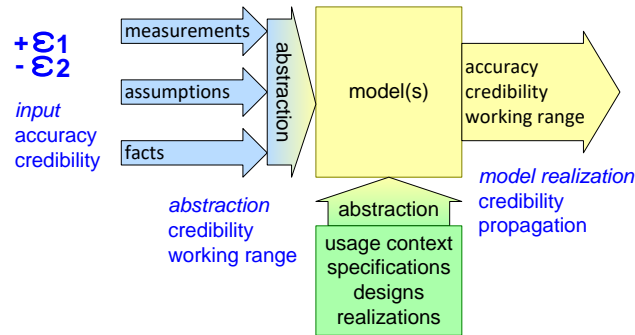


Figure 2: Applicability of the Model

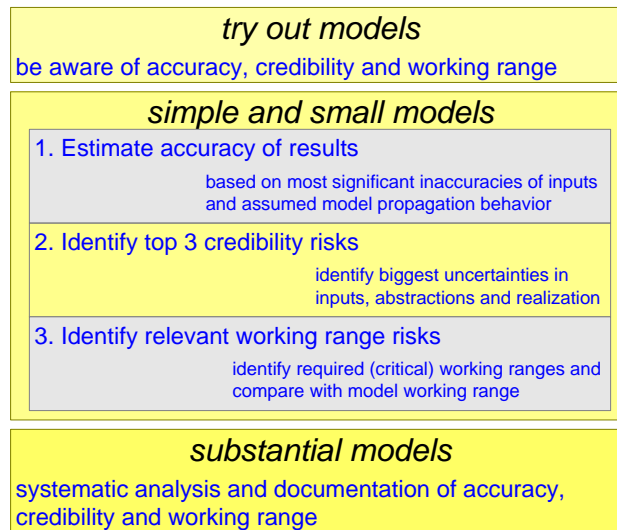
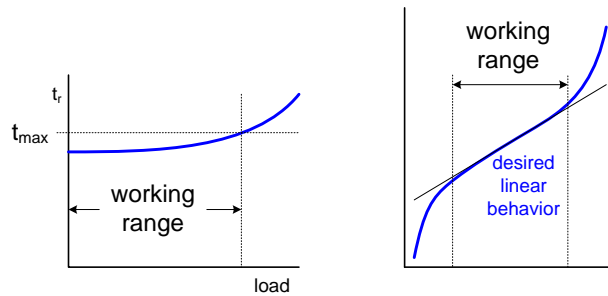


Figure 3: How to Determine Applicability



A system design assumption is often:
 the performance of this function
 { is constant | is linear | doesn't exceed x | ... }

The working range is the interval where this assumption holds

Figure 4: Working Range examples

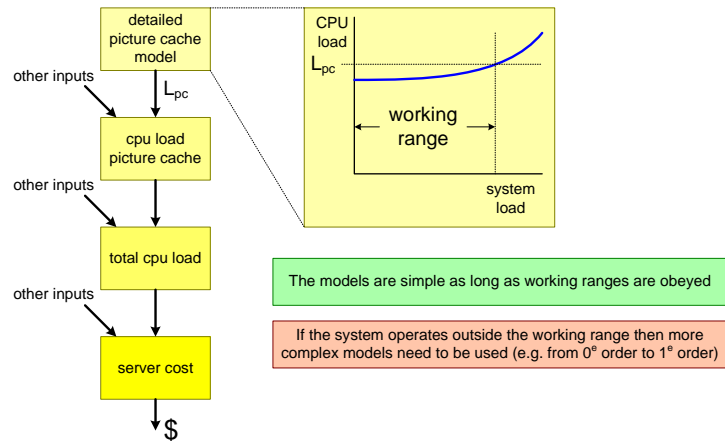


Figure 5: Example of Picture Cache Working Range

discrete events in continuous world
discretization artefacts
e.g. stepwise simulations

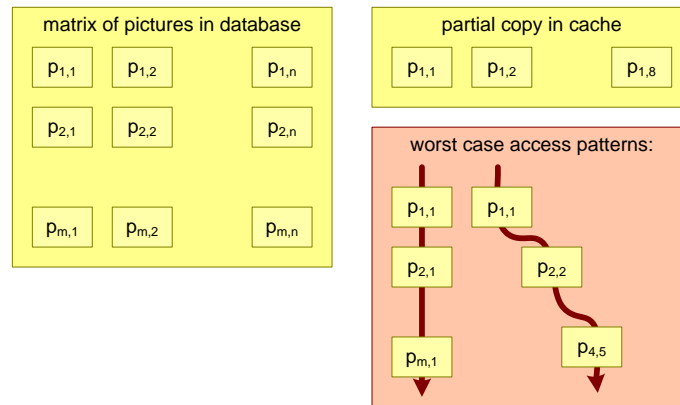
(too) systematic input data
random data show different behavior
e.g. memory fragmentation

fragile model
small model change results in large shift in results

self fulfilling prophecy
price erosions + cost increase (inflation) -> bankruptcy

Figure 6: Common Pitfalls

3 Design quality



What is the system behavior and performance for worst case access patterns?

Figure 7: Example of Worst Case Picture Cache

Which design assumptions have a big impact on system performance?

What are the worst cases for these assumptions?

How does the system behave in the worst case?

- poor performance within spec
- poor performance not within spec
- failure -> reliability issue

Figure 8: Worst Case Questions

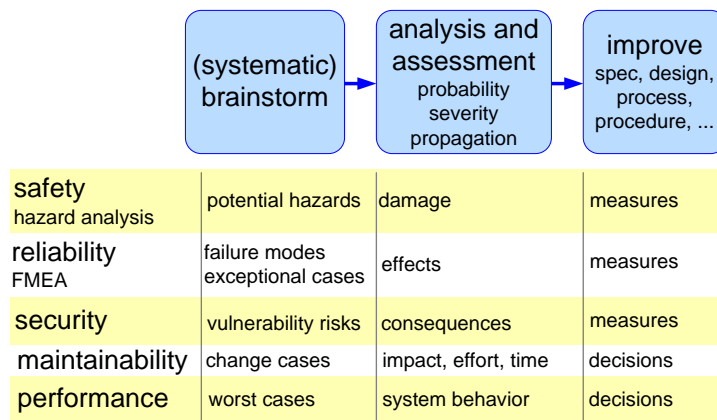


Figure 9: FMEA-like Analysis Techniques

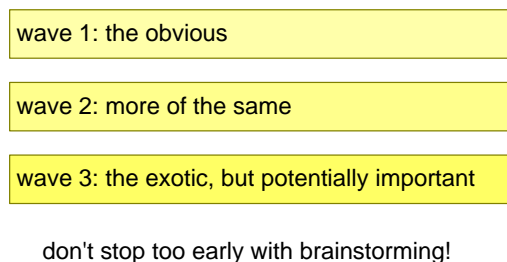


Figure 10: Brainstorming Phases

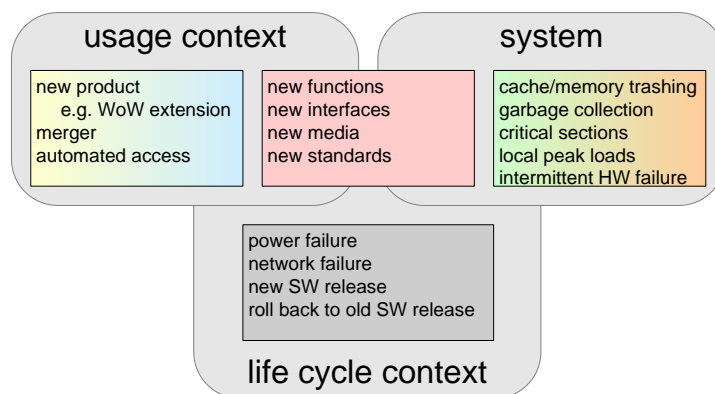
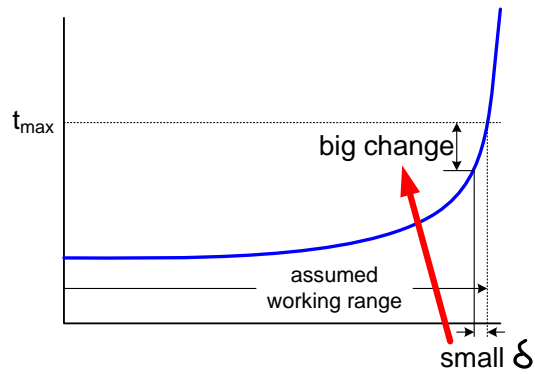


Figure 11: Different Viewpoints for Analysis



sensitivity: how sensitive is the system output for small changes in input or realization?

Figure 12: Example Sensitivity

*CPU utilization is "only" 8%
what is the efficiency?*

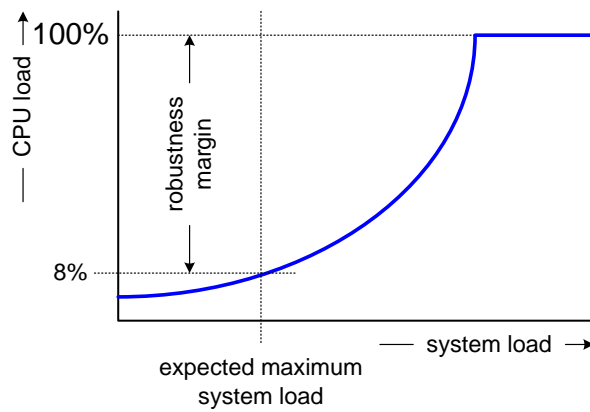


Figure 13: Example of CPU Utilization and Efficiency

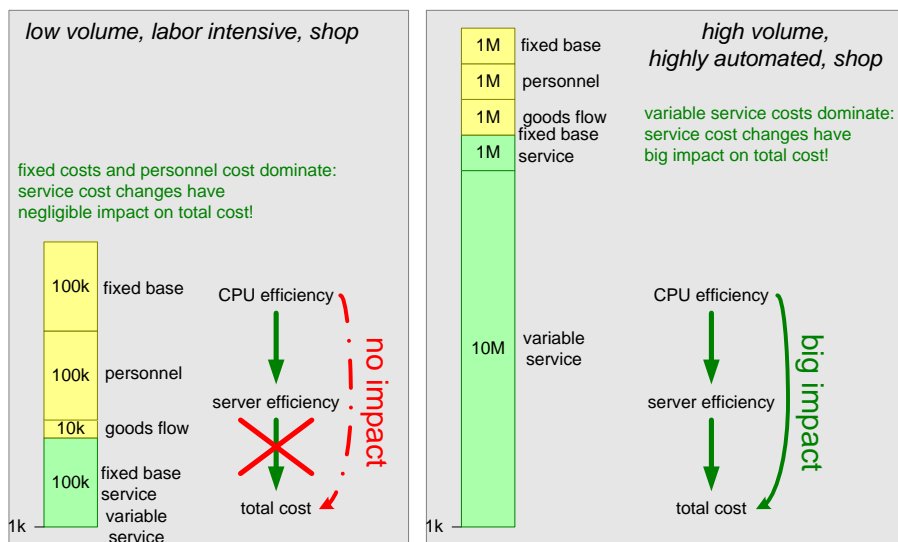


Figure 14: Efficiency is Context Dependent!

4 Specification feasibility

5 Life Cycle Changes

6 Inputs

7 Summary

References

- [1] Gerrit Muller. The system architecture homepage. <http://www.gaudisite.nl/index.html>, 1999.

History

Version: 0.2, date: 27 February, 2007 changed by: Gerrit Muller

- article version without text created
- logo defined

Version: 0.1, date: 17 January, 2007 changed by: Gerrit Muller

- added list with pitfalls
- added working range examples
- added worst case example and questions
- added brainstorm recommendation
- added FMEA-like method
- added analysis viewpoints
- added efficiency, sensitivity and robustness slides

Version: 0, date: 16 January, 2007 changed by: Gerrit Muller

- Created, no changelog yet