

## Deeper ●

- What is the difference between a descriptive model for a user and a descriptive model for a developer?

*User models describe the system's external appearance and function. Developer models describe internal structure and operation.*

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## Deeper ●

- Give examples of requirements questions that could be answered by analytical modeling?

*Task structure and user interface questions are often best answered by prototype usability questions.*

*Estimates of required performance can often be modeled by simple mathematical modeling.*

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## Deeper ●

- What is the difference between a product mock-up and an engineering proof of concept?

*The purpose of a product mock-up is to show potential supporters/customers what the product would look like.*

*The purpose of an engineering proof-of-concept is to demonstrate that we have a viable solution to what has here-to-fore been considered to be a hard problem.*

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## Deeper ●

- Give examples of a consumer product or service mock-up.

*A hand-made prototype of a new personal music player.*

*Simulated content and interactions with a new web service.*

*A Tivo-like product implemented on a workstation rather than in a custom appliance.*

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## Deeper ●

- What is the wisdom behind modeling with a purpose?

*If you are very clear about your goals:*

- *it is more likely that they have been well refined.*
- *you are likely to chart a more direct path to them.*
- *you are less likely to be distracted by tangential issues.*
- *you will be more likely to recognize whether or not you have achieved them.*

*If you're modeling without clear goals, you may spend lots of time building the wrong things.*

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## Deeper ●

- Examples of descriptive model purpose?

*Management ... which pieces need to be built*

*Development ... what each component does*

*Support ... how components will be deployed*

*Training ... how to use the system*

- Examples of analytical model purpose?

*Management ... to size a task*

*Development ... to validate an approach*

*Support ... how system must be configured*

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## Deeper

- What is the wisdom behind traveling light?

*Ongoing maintenance is a killer, and models are no exception. It takes work to keep models up-to-date with changing requirements and design.*

*The fewer things you decide to maintain, the less time you will spend maintaining them.*

*Discarding a model after it has served its purpose is a good thing.*

*Relatively few models are worth keeping.*

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## Deeper

- Traveling light for descriptive models?

*Figure out which design models will be the most useful, and then build only those.*

*Understand which models will be superceded by the code, and which (few) will be kept for training purposes.*

- Traveling light for analytical models?

*Precisely understand the key question, and model only what is necessary to answer it.*

*Understand which few models will have ongoing value.*

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## Deeper

- What is the wisdom behind using multiple models?

*This is where "one size fits all" meets "divide and conquer".*

*Smaller and simpler models that attempt to directly address particular problems will generally do so more effectively.*

*Moreover, it will often be the case that N smaller models can be built much more quickly and easily than a single super-model to address the same issues.*

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## Deeper

- Interpret multiple for descriptive models?

*Use multiple types of models (behavioral, structural) to illustrate different aspects of the system.*

*Separate models for independent subsystems will be simpler and easier to understand.*

- Interpret multiple for analytical models?

*Don't try to get one model to answer all your questions. Build different kinds of models to answer different kinds of questions.*

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## Deeper

- What is the wisdom behind putting content over representation?

*Standard representations are seldom requirements to be imposed on projects. They are tools that have been developed to help solve particular problems.*

*If a standard representation doesn't quite meet your needs, or if it seems to heavy for your problem, you are usually free to improvise a more appropriate representation.*

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## Deeper

- What does content over form mean for descriptive models?

*Don't worry about strict adherence to a particular modeling language. Represent your system in any way that works.*

- What does content over form mean for analytical models?

*Don't feel obligated to use a more formal or powerful modeling technique if a simpler one will (reliably) give you the answer you need.*

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## Deeper

- What can we do if a Markov model tells us we will spend too much of our time in an unavailable state?
  1. *speed up the repair time for that state.*
  2. *reduce the number of incidents that lead to that state.*
  3. *change the design so that the system can continue to provide service while in that state.*

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## Deeper

- Why might we prefer to test a component like a scheduler in a simulator (vs. in a real system)?

*A real system might not be available (yet).  
A simulator can force decisions through the scheduler many orders of magnitude faster than a real system would, enabling us to collect data against a wider range of traffic patterns in a shorter period of time.*

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## Deeper

- Why might random traffic be better than sampled traffic?

*One sample may not be representative of all likely usage scenarios. Random traffic may provide fuller exercise.*
- Why might captured traffic be better than randomly generated traffic?

*Real traffic isn't random. There are patterns to requests, and better algorithms often exploit knowledge of these patterns.*

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## Deeper

- How do you decide what your “proof of concept” prototype should do?

*What doubts that need to be assuaged?  
What demonstration would clearly assuage them?*

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