

Modeling

Alcino Cunha

What is a model?

What is a model?

“A simplified description, especially a mathematical one, of a system or process, to assist calculations and predictions”

Google Dictionary

What is a model?

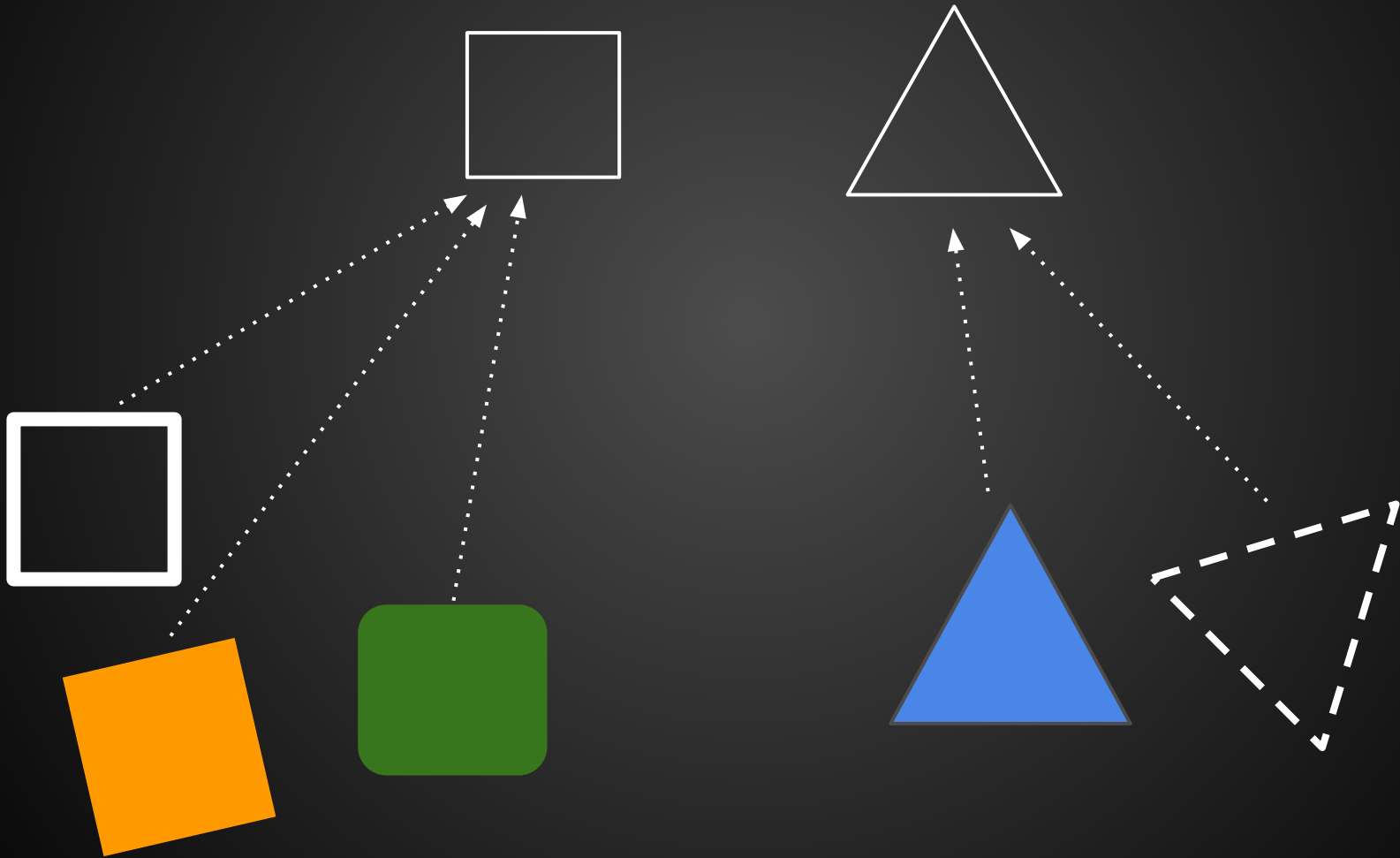
“I use the term ‘model’ for a description of a software abstraction.”

“An abstraction is not a module, or an interface, class, or method; it is a structure, pure and simple - an idea reduced to its essential form.”

“The core of software development, therefore, is the design of abstractions.”

Daniel Jackson

What is a model?



What is a model?

“Simplicity does not precede complexity, but follows it.”

Alan Perlis

Why model?

Why model?

- To explain and predict phenomena
- To predict other (and new) phenomena
- To build and design systems

Why model?



Why model?



Why model?

“The first principle is that you must not fool yourself, and you are the easiest person to fool.”

Richard Feynman

Why model?

“I conclude there are two ways of constructing a software design: one way is to make it so simple there are obviously no deficiencies, and the other way is to make it so complicated that there are no obvious deficiencies.”

Tony Hoare

Why model?

- Clarify and validate requirements
- Verify assumptions
- Explore alternative designs
- Documentation
- ...

How to model?

How to model?

“All models are wrong, but some are useful.”

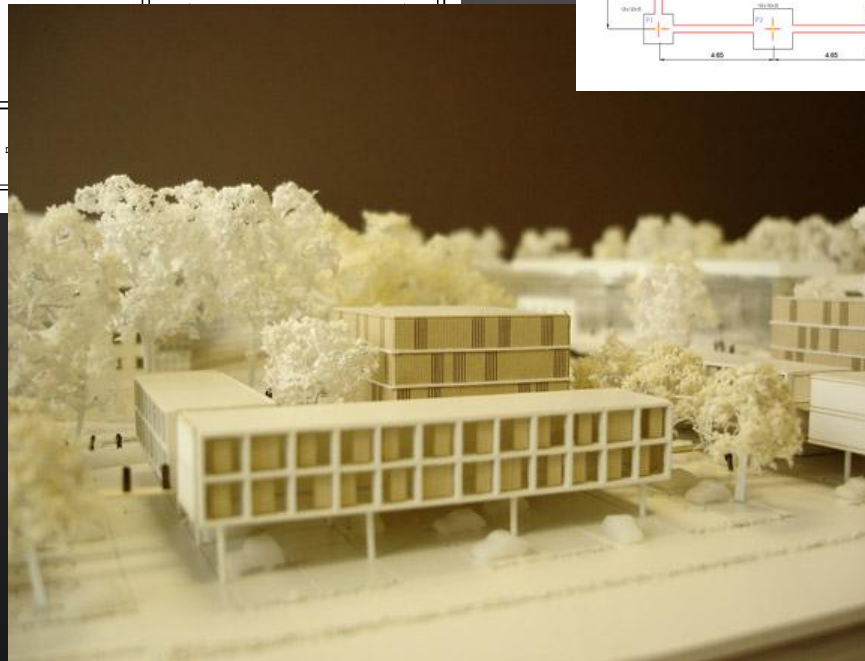
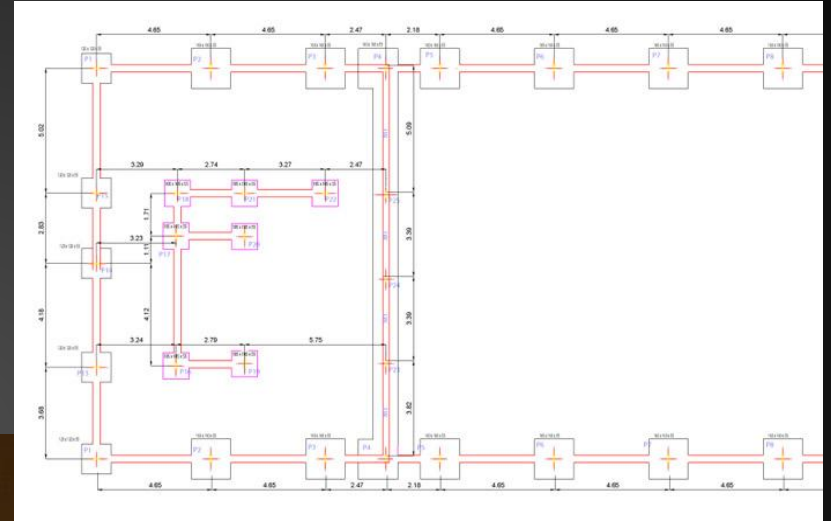
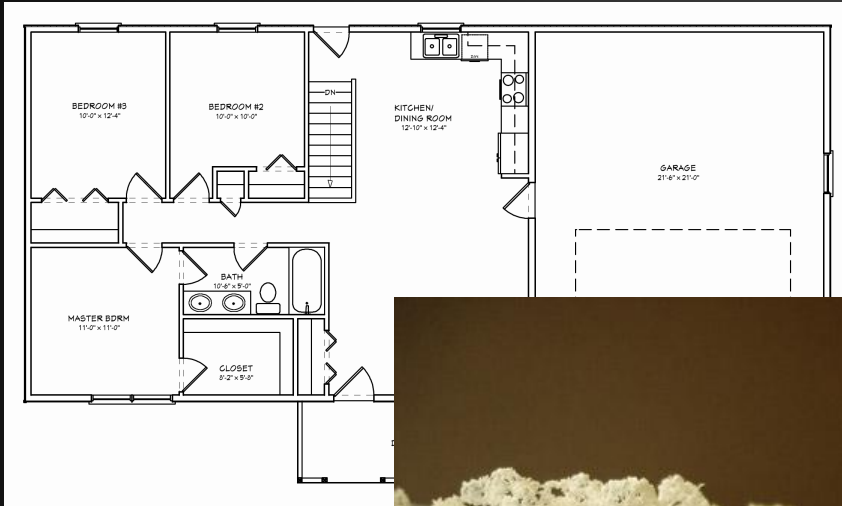
George E. P. Box

How to model?

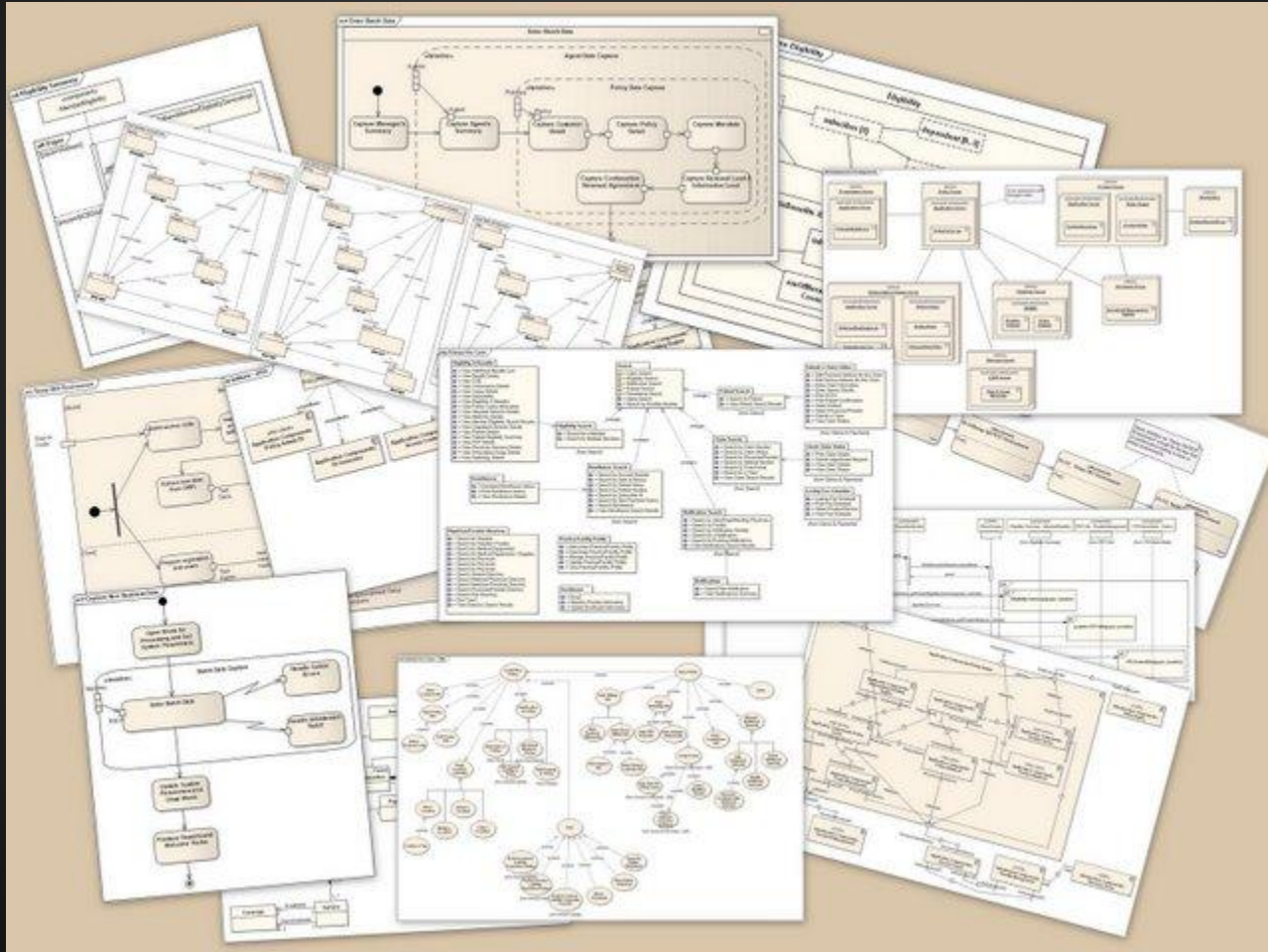
“If I had a hammer I'd hammer in the morning,
I'd hammer in the evening all over this land.”

Pete Seeger and Lee Hays

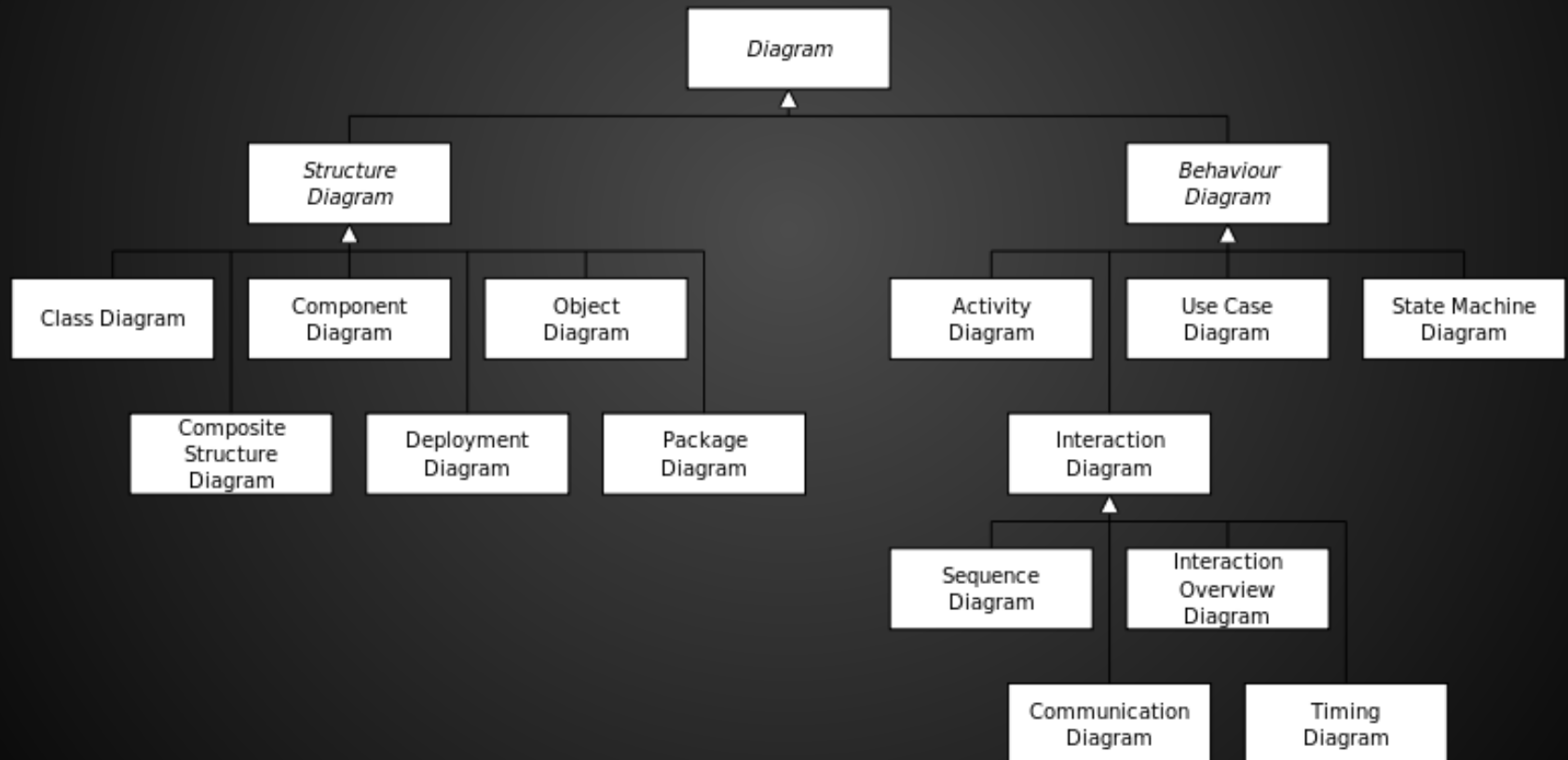
How to model?



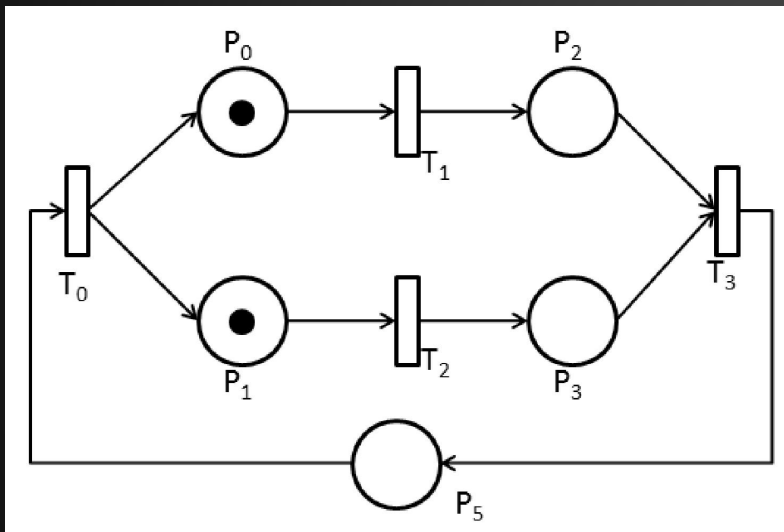
How to model?



How to model?



How to model?



VS

```
abstract sig Object {}  
  
sig Dir,File extends Object {}  
  
sig FS {  
  objects : set Object,  
  parent : Object -> lone Dir,  
  path : lone Dir  
}  
  
pred Objects [fs : FS] {  
  fs.path in fs.objects  
  fs.parent in fs.objects -> one fs.objects  
}  
  
pred Aciclico [fs : FS] {  
  lone d : fs.objects | d in d.^(fs.parent)  
}  
  
pred Inv [fs : FS] {  
  Objects[fs]  
  Aciclico[fs]  
}
```

How to model?

What is a good modeling language?

- Notation tailored for abstraction
- Support for automated analysis
- Formal but not intimidating

Let's model!

The genealogy software should collect the date and place of an individual's birth, marriage, and death, and store the relationships of individuals to their parents, spouses, and children. It should be flexible in allowing for the input of children born out of wedlock or for varying types of spousal relationships.