

# Example-Driven Modeling

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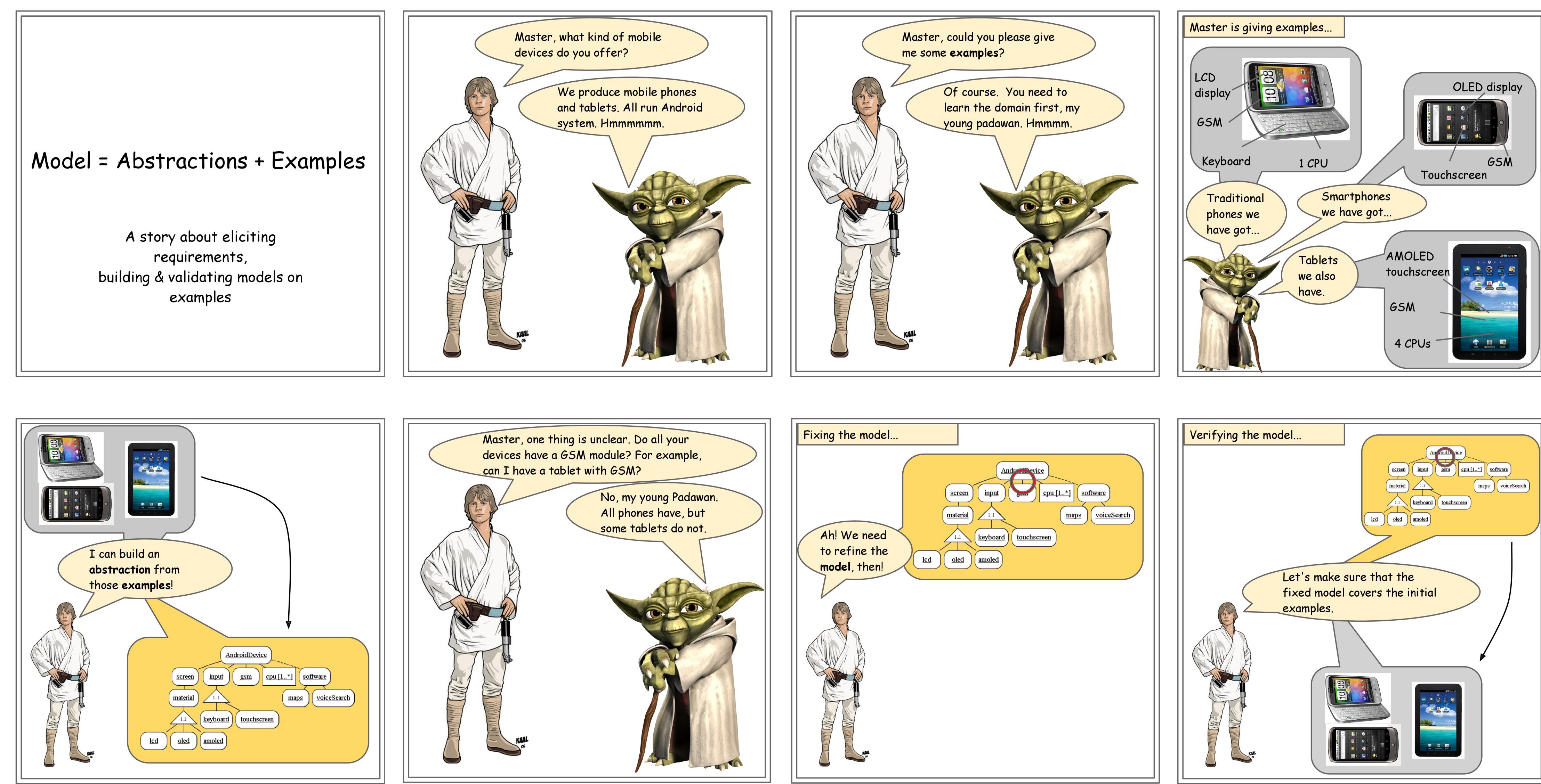
<http://gsd.uwaterloo.ca/edm>

## Example-Driven Modeling

The use of examples is critical for a more widespread adoption of modeling as it makes modeling more accessible to non-experts. We propose Example-Driven Modeling (EDM), an approach that systematically uses explicit examples for eliciting, modeling, verifying, and validating complex business knowledge. It emphasizes the use of explicit examples together with abstractions, both for presenting information and when exchanging models.

## Why EDM?

1. Constructing models with the aid of explicit examples improves the quality of models.
2. Augmenting models with explicit examples improves model comprehension among various stakeholders.



## Set of Examples

options size large	options cache
options size small	

## Abstraction

abstract options  
xor size  
large  
small  
cache ?

Infer

Derive

## Derived Examples

options size large	options size large cache
options size small	options size small cache

## Inference & Derivation

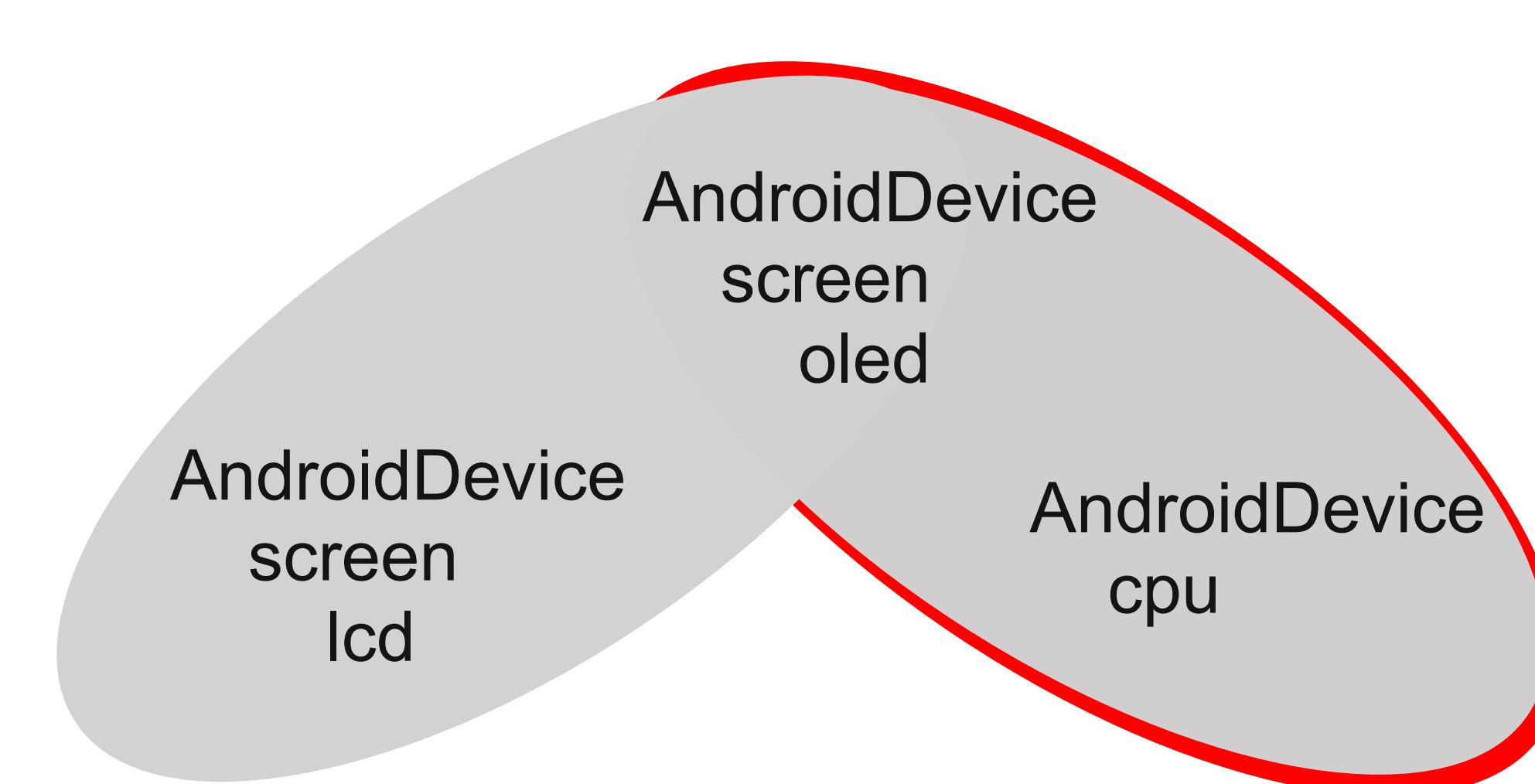
EDM distinguishes two non-trivial activities that relate examples with abstractions: 1) Abstraction Inference (AI) – for synthesizing abstractions from a set of examples, 2) ExampleDerivation (ED) – for generating examples from abstractions. EDM starts either with abstractions or examples. Modeler typically goes back and forth between the two.

## How to Use Examples?

There is still little known about examples in modeling from user's viewpoint. We need empirical studies showing the impact of using a variety of examples on model construction, comprehension, and validation. The studies should investigate properties of individual examples (*What examples are useful? What are the benefits of adding negative examples? How to derive near-miss examples? How to find minimal examples?*), properties of the whole population (*Is it representative? Is it diverse enough? Is it minimal?*), and the ordering of presenting examples to stakeholders (*How to effectively explore examples? How to show differences among examples?*).

## Near-Miss Examples

The choice of examples is important for the effectiveness of comprehension and knowledge transfer. The most effective are near-miss contrasting examples. They emphasize the critical differences, which helps humans build flexible abstractions. Too contrasting examples, however, are ineffective in spotting the critical differences and negatively impact knowledge transfer. We hypothesize that a specific, yet to be defined, variety of examples is needed to build, understand, and validate models effectively.



## Negative Examples

While positive examples specify correct model instances, negative examples represent disallowed instances, i.e., they can be abstracted as model constraints. Constraints reduce model's variability and uncertainty, thus making it more precise. A pair of near-miss examples may include a positive and a negative one. Understanding such pairs gives additional insight into models and helps to reason why and when the model is correct.

AndroidDevice  
screen  
amoled  
input  
touchscreen

**negative** AndroidDevice  
screen  
amoled  
input  
keyboard

abstract AndroidDevice  
screen  
amoled  
**xor** input  
keyboard  
[amoled && !keyboard]

## Research Agenda

1. Defining methodology for empirical studies
2. Evaluating hypotheses
3. Improving existing methods, languages, and tools