Design
Plans are worthless.
Planning is priceless.

(misquote of Eisenhower
-- but what he meant)
Designs are worthless.
Designing is priceless.

(don't quote me!)
Triangle World

I have a sealed room in which some triangles are magically suspended in the air. Their position and orientation is random. There is also a ball in the room. It has some position and velocity at time t. (It does not intersect any triangles at time t.)

Describe the room and the ball’s movement between time t and t+\Delta t. (In other words, write the dt-timestep use case.)
Triangle World

Build a domain model for triangle world.
Domain Model Example

- Room
- Meeting
- Time Slot
- Semester
- Instructor
- Department
- College
- Course
- Major
- Textbook
- Class List
- Student
- Author

Uses

Written by
Example

Which did you have?

- Ball
- Sphere
- Triangle
- Polygon
- Thing
- Shape
- Moving shape
- Moving object
- Velocity

- Walls
- Floor
- World
- Force
- Gravity
- Collision
- Position
- Item
Ball vs. Sphere vs. Shape

What is the relationship?
design heuristic

think like an object
Ball vs. Sphere vs. Shape

What is the relationship?
Ball vs. Sphere vs. Shape

What is the relationship?

Ball

Shape

Sphere
Ball vs. Sphere vs. Shape

What is the relationship?
design heuristic

think like an object
design heuristic

favor composition over inheritance
Inheritance vs. Composition

white-box reuse

black-box reuse
Ball vs. Sphere vs. Shape

Ball

Shape

Sphere
Ball vs. Moving

What is the relationship?

| Ball | velocity |

Should we anticipate static balls?
Ball vs. Moving

What is the relationship?

Ball

Static ball          Moving ball
Shape vs. Moving

Should we anticipate moving triangles?

Shape

Static shape
- sphere
- triangle

Moving shape
- sphere
- triangle
Shape vs. Moving

What is the relationship?

- Shape
- Moving thing
- Moving shape
Shape vs. Moving

What is the relationship?

Moving thing  Shape

Diagram showing the relationship between Moving thing and Shape.
XP Design Principle

• Only build what you need now.
Cohesion & Coupling

world

ball  triangles  walls
design heuristic

class should have high cohesion and low coupling
cohesion & coupling

• cohesion: how closely the operations in a class or method are related
• coupling: the strength of a connection between two classes or methods
Cohesion & Coupling

world

ball  triangles  walls

walls can be made of triangles
Cohesion & Coupling

Who handles collisions?
Cohesion & Coupling

world
  ball  triangles
      collision handler
Exercise: UML for a preliminary triangle world design