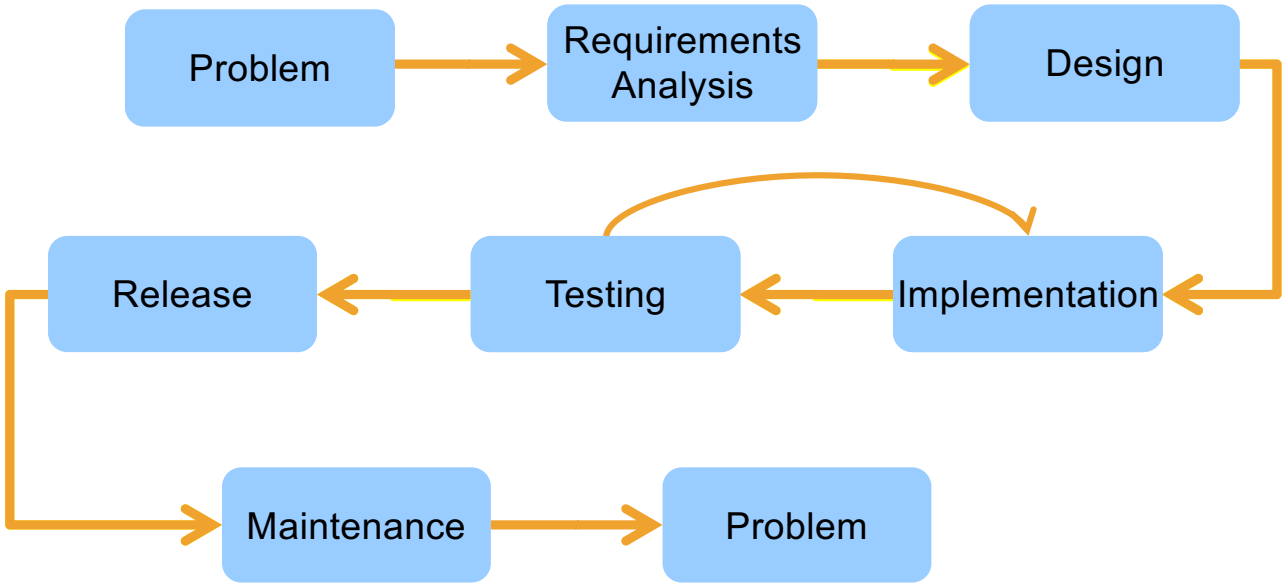
CS 4320 / 7320 Software Engineering

Models and Methods:

METHODS (and some review)

What is the SDLC?



… and back to the beginning…

What are the key factors for a
DEFINITION
of Software Engineering?

Software Engineering is…

"…the application of a systematic, disciplined, *quantifiable* approach to the development, operation, and maintenance of software; that is, the application of engineering to software."

ISO/IEC/IEEE Systems and Software Engineering Vocabulary

Goals of Software Engineering

What are the key items to include in a
LIST OF GOALS
for Software Engineering?

Goals of Software Engineering:

1. Dependability
2. Maintainability
3. Efficiency
4. Acceptability
5. Security

Ian Sommerville, Software Engineering 9th ed.

Software Engineering Methods

Organized and **systematic** approaches
to developing software

As an engineer, you choose
an appropriate ***method*** or ***methods***

** See SWEBOK Chapter 9

Software Engineering Methods

Types:

- Heuristic
- Formal
- Prototyping
- Agile

Heuristic Methods

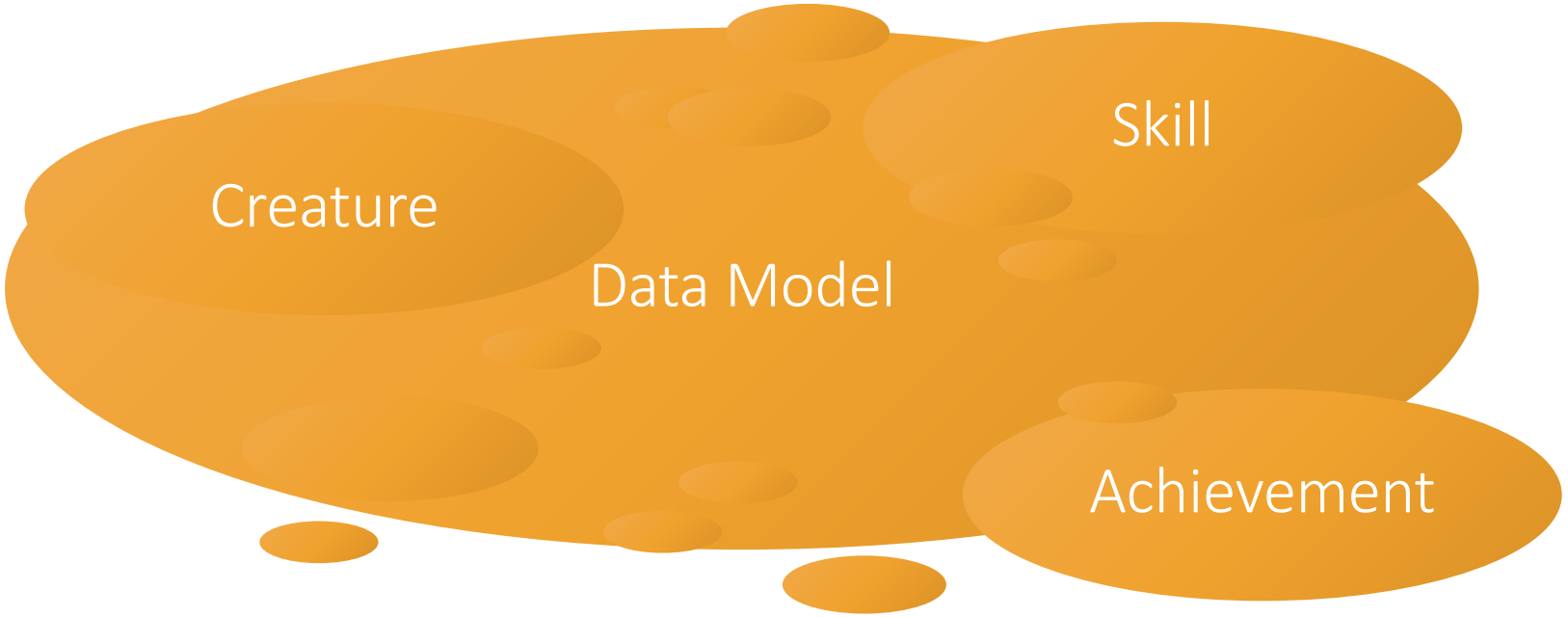
Structured Analysis and Design Methods

Data Modeling Methods

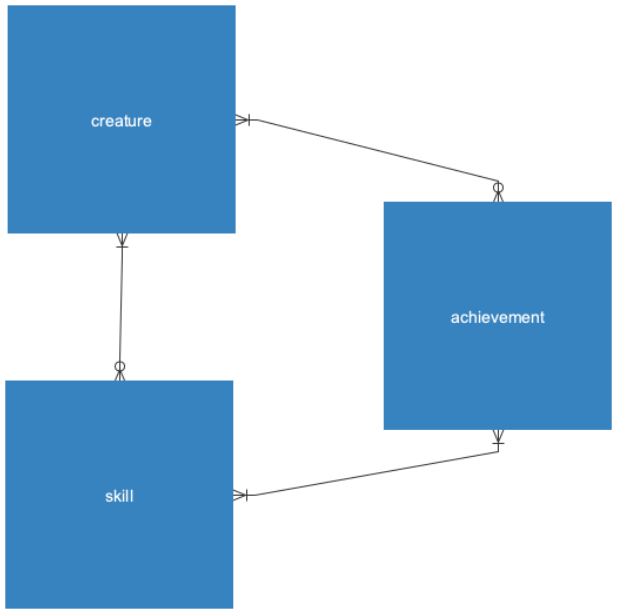
Object Oriented Analysis and Design Methods

Heuristic Methods: Structured Analysis and Design

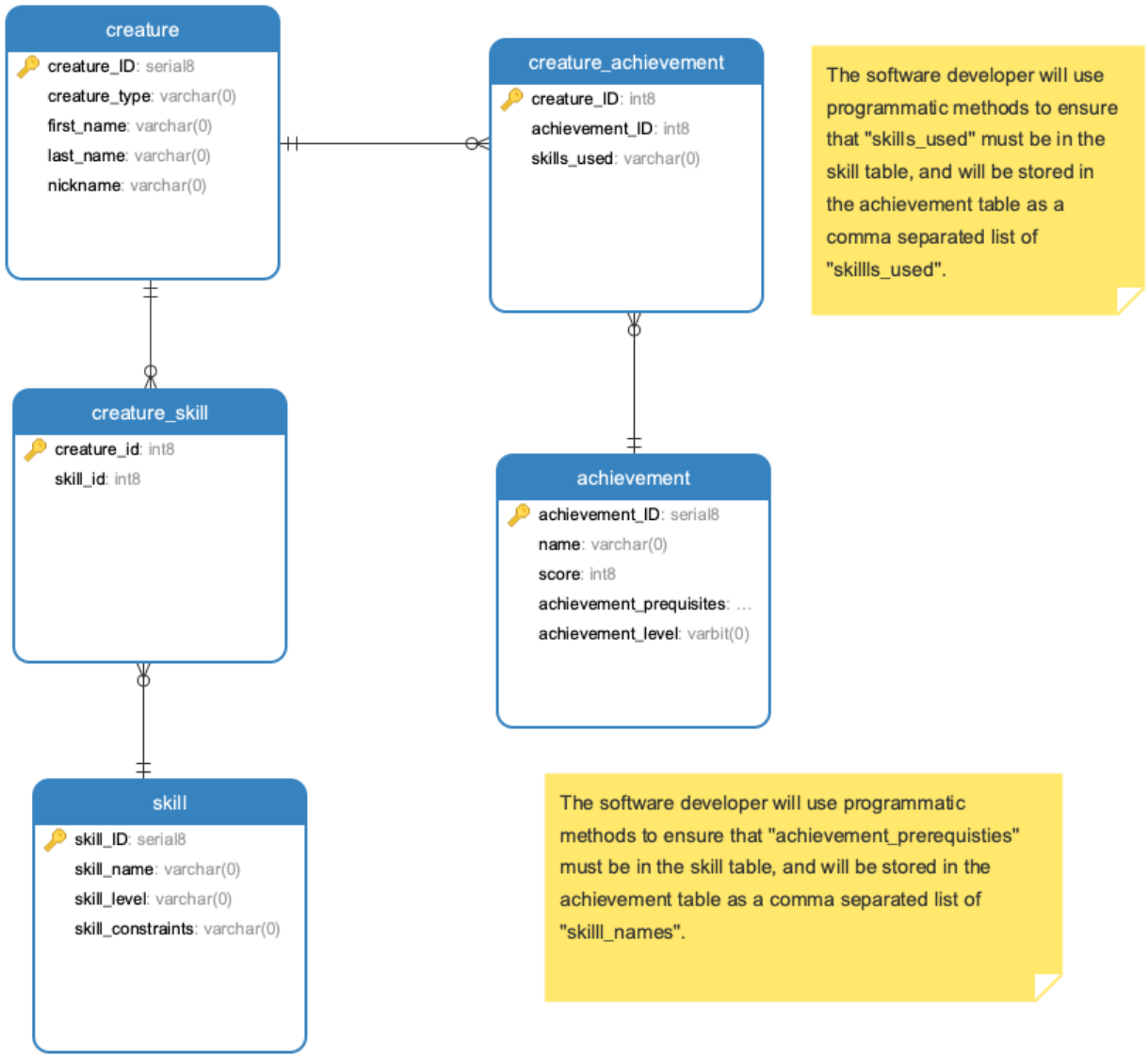
Heuristic Methods: Data Modeling



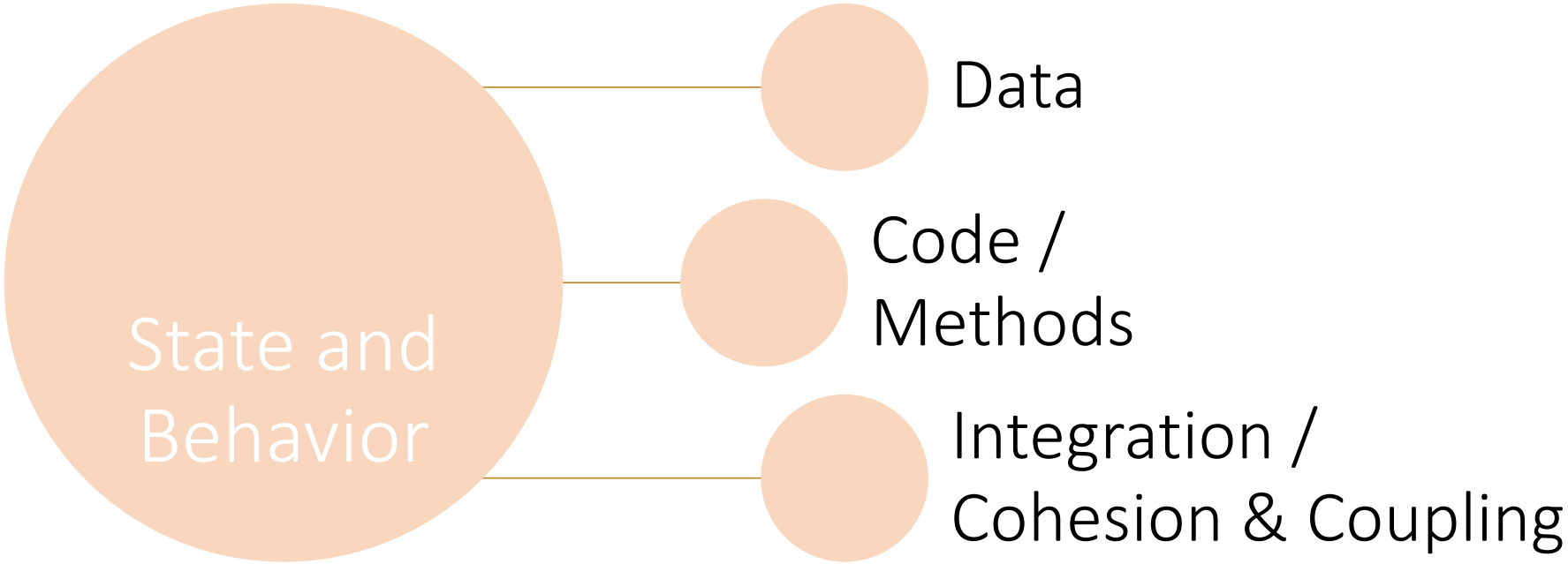
Conceptual Model




creature
creature_ID: DECIMAL
creature_type: VARCHAR
first_name: VARCHAR
last_name: VARCHAR
nickname: VARCHAR
creature_achievement
creature_ID: DECIMAL
achievement_ID: DECIMAL
skills_used: VARCHAR
creature_skill
creature_id: DECIMAL
skill_id: DECIMAL
achievement
achievement_ID: DECIMAL
name: VARCHAR
score: DECIMAL
achievement_prequisites: ...
achievement_level: BLOB
skill
skill_ID: DECIMAL
skill_name: VARCHAR
skill_level: VARCHAR
skill_constraints: VARCHAR


creature
creature_ID: serial8
creature_type: varchar(0)
first_name: varchar(0)
last_name: varchar(0)
nickname: varchar(0)
creature_achievement
creature_ID: int8
achievement_ID: int8
skills_used: varchar(0)
The software developer will use programmatic methods to ensure that "skills_used" must be in the skill table, and will be stored in the achievement table as a comma separated list of "skillls_used".
creature_skill
creature_id: int8
skill_id: int8
achievement
achievement_ID: serial8
name: varchar(0)
score: int8
achievement_prequisites: ...
achievement_level: varbit(0)
skill
skill_ID: serial8
skill_name: varchar(0)
skill_level: varchar(0)
skill_constraints: varchar(0)
The software developer will use programmatic methods to ensure that "achievement_prerequisties" must be in the skill table, and will be stored in the achievement table as a comma separated list of "skilll_names".

Heuristic Methods:
Object Oriented Analysis and Design



Formal Methods

Safety Critical Systems

Systems that must be maximally deterministic

Mathematically verifiable

Prototyping Methods

What is a prototype?

Styles:

1. *Throwaway*
2. *Evolutionary*
3. *Executable Specification*

Prototyping Methods

Examples of prototyping targets:

1. *Requirements specification*
2. *Architectural design element*
3. *Human-machine user interface*

Prototyping Methods

Evaluation techniques:

(Depends on the reason for prototyping)

Evaluated against implemented software

Evaluated against target set of requirements

Serve as a model for software development

Agile Methods in Historical Context

1990's

From a desire to reduce overhead associated with plan-based methods ("waterfall") **readings

Agile founders were concerned with values and principles rather than rigid, codified methodologies **readings

** Also Historical and comparative readings

Agile Methods

Typical characteristics of agile methodologies:

- Short, iterative development cycles
- Working product each iteration
- Self-organizing teams
- Refactoring
- Test-driven development
- Close customer involvement

Agile Methods:
Rapid Application Development (RAD)

Agile Methods:
eXtreme Programming (XP)

Agile Methods: Scrum

Agile Methods:
Feature-Driven Development

Done!