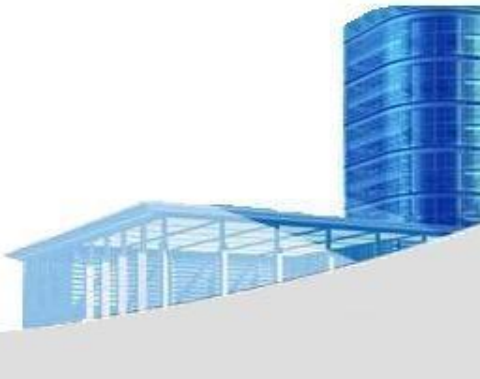
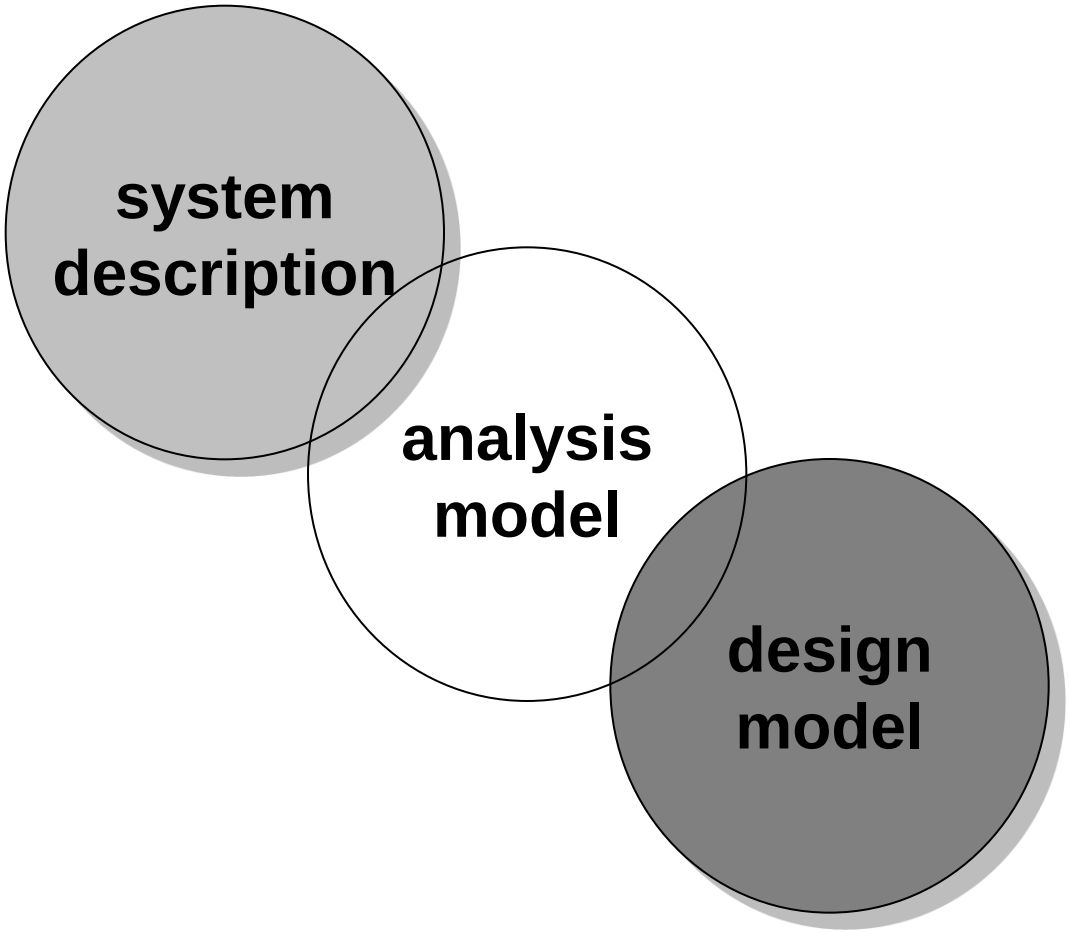
Ch.9 Requirements Modeling: Scenario-Based Methods



Requirements Analysis

- objectives
  - Describe what the customer requires
  - Establish a basis for the creation of a software design
  - Define a set of requirements that can be validated
- Requirements analysis allows the software engineer (called an *analyst* or *modeler* in this role) to:
  - elaborate on basic requirements established during earlier requirement engineering tasks
  - build models that depict user scenarios, functional activities, problem classes and their relationships, system and class behavior, the flow of data as it is transformed, constraints that software must meet.

A Bridge

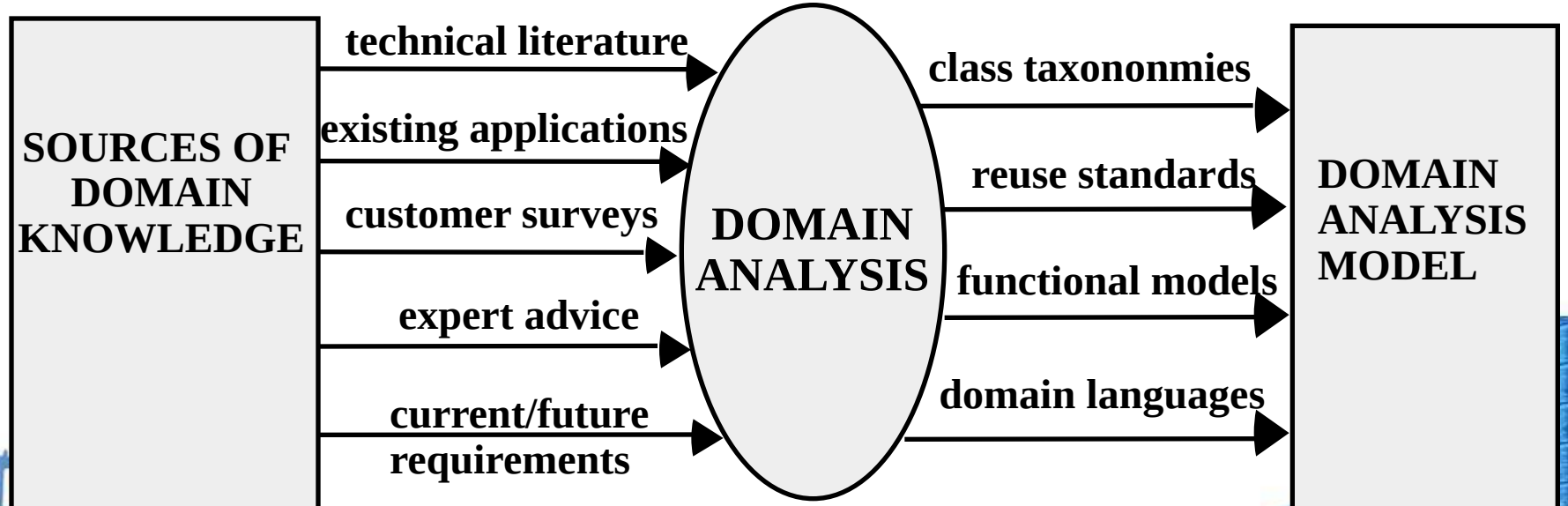


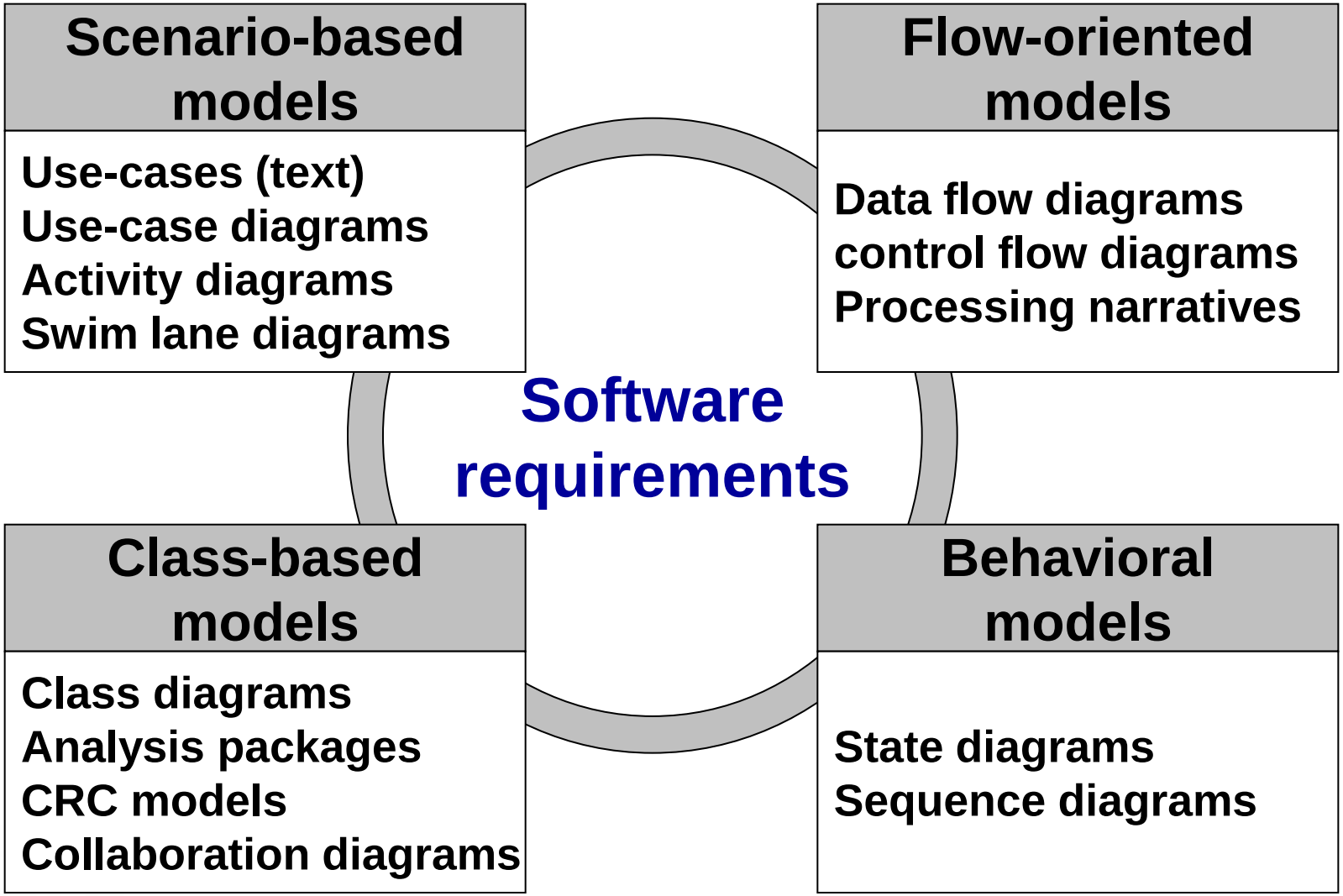
Rules of Thumb

- The model should focus on requirements that are visible within the problem or business domain. The level of abstraction should be relatively high.
- Each element of the analysis model should add to an overall understanding of software requirements and provide insight into the information domain, function and behavior of the system.
- Delay consideration of infrastructure and other non-functional models until design.
- Minimize coupling throughout the system.
- Be certain that the analysis model provides value to all stakeholders.
- Keep the model as simple as it can be.

Domain Analysis

Goal: **Software domain analysis is the identification, analysis, and specification of common requirements from a specific application domain, typically for reuse on multiple projects within that application domain . . .**




Scenario-based models
Use-cases (text)
Use-case diagrams
Activity diagrams
Swim lane diagrams
Flow-oriented models
Data flow diagrams
control flow diagrams
Processing narratives
Software requirements
Class-based models
Class diagrams
Analysis packages
CRC models
Collaboration diagrams
Behavioral models
State diagrams
Sequence diagrams

Scenario-Based Modeling

Use-cases are simply an aid to defining what exists outside the system (actors) and what should be performed by the system

(1) What should we write about?

(2) How much should we write about it?

(3) How detailed should we make our description?

(4) How should we organize the description?

Use-Cases

- **a scenario that describes a “thread of usage” for a system**
- ***actors* represent roles people or devices play as the system functions**
- ***users* can play a number of different roles for a given scenario**

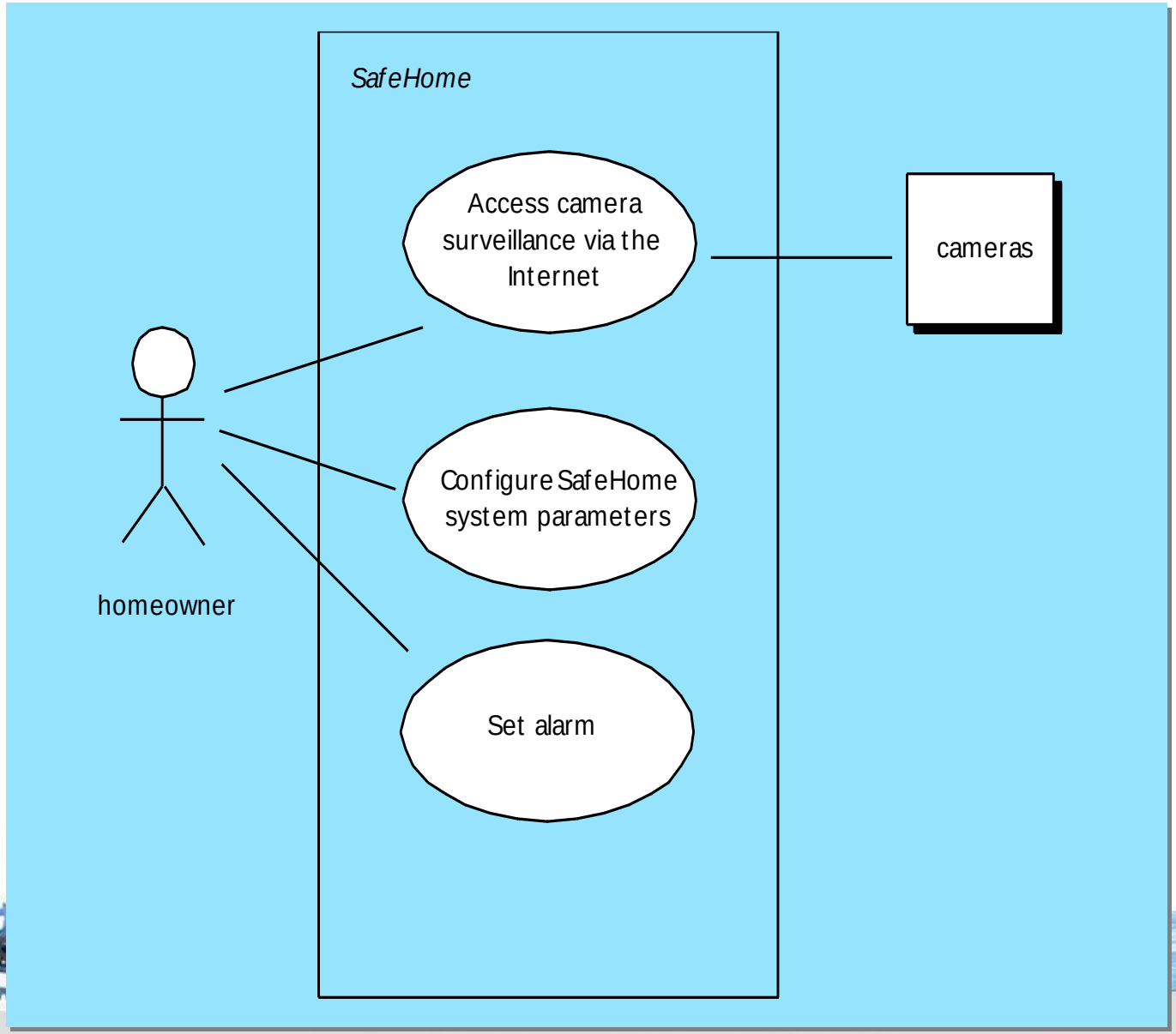
Developing a Use-Case

- What are the main tasks or functions that are performed by the actor?
- What system information will the actor acquire, produce or change?
- Will the actor have to inform the system about changes in the external environment?
- What information does the actor desire from the system?
- Does the actor wish to be informed about unexpected changes?

Reviewing a Use-Case

- Use-cases are written first in narrative form and mapped to a template if formality is needed
- Each primary scenario should be reviewed and refined to see if alternative interactions are possible
  - Can the actor take some other action at this point?
  - Is it possible that the actor will encounter an error condition at some point? If so, what?
  - Is it possible that the actor will encounter some other behavior at some point? If so, what?

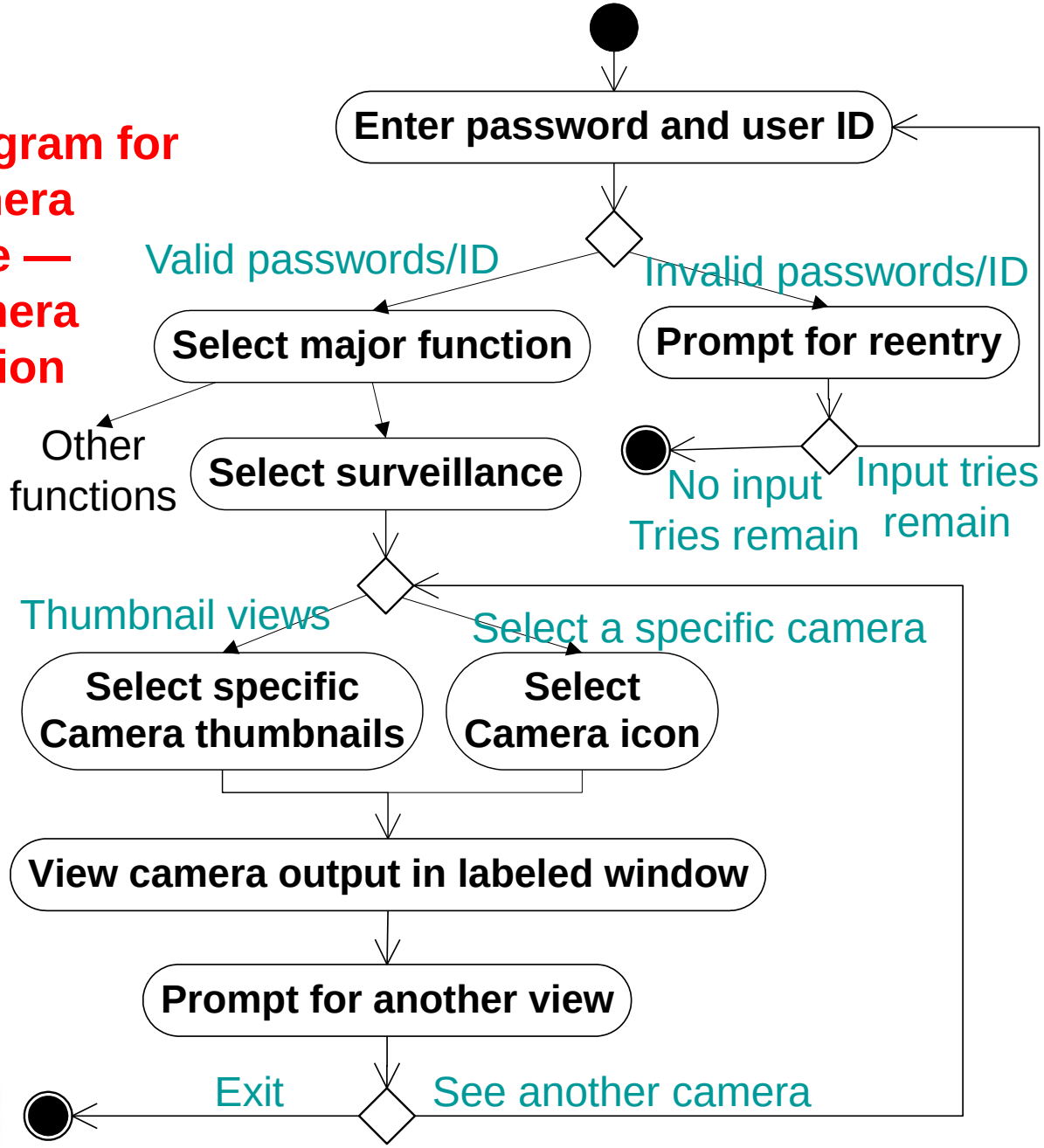
Use-Case Diagram

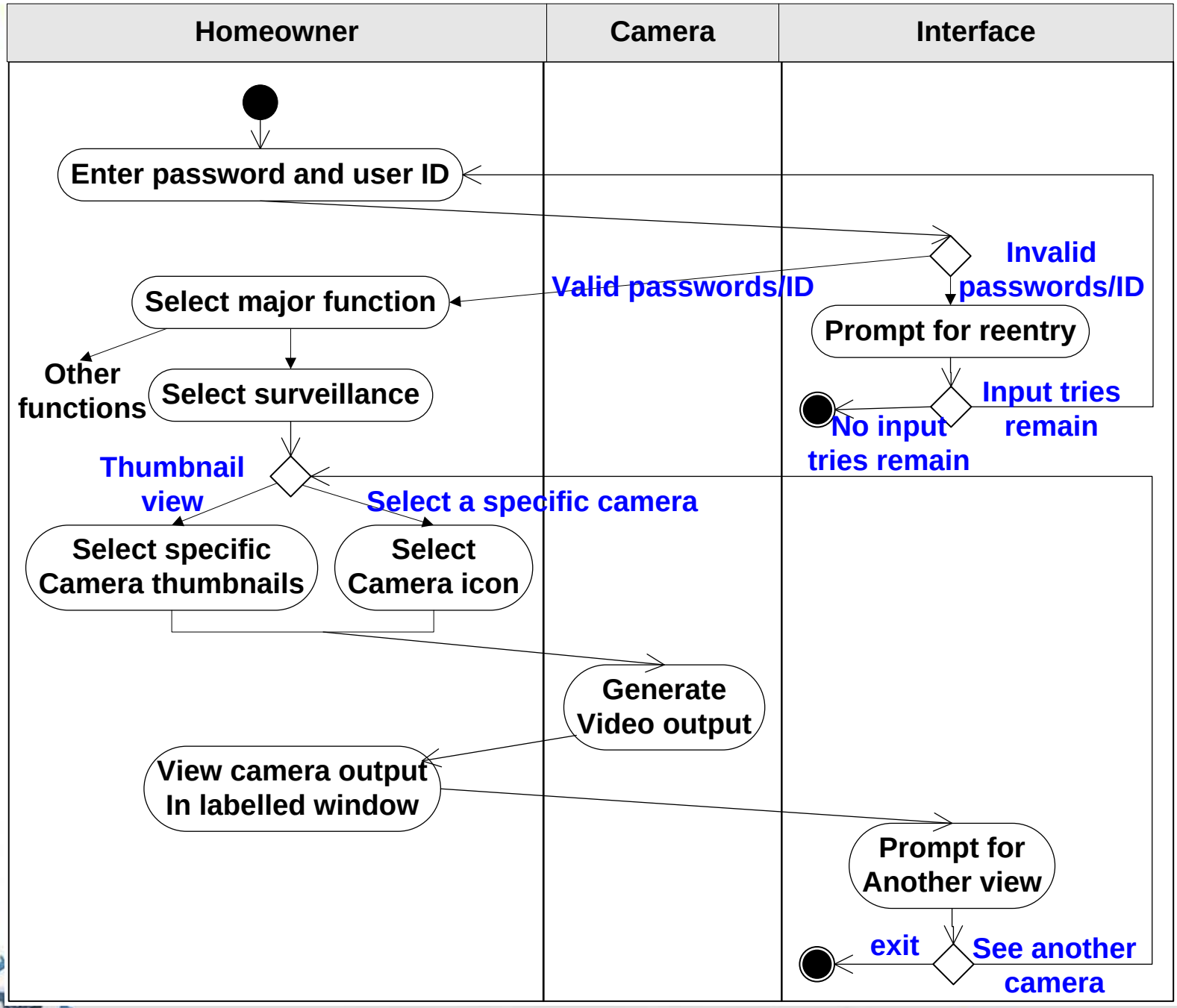


Activity and Swim Lane Diagrams

- **Activity diagram** supplements the use-case by providing a diagrammatic representation of procedural flow
- **Swim lane diagram** allows the modeler to represent the flow of activities described by the use-case and at the same time indicate which actor (if there are **multiple actors** involved in a specific use-case) or analysis class has **responsibility** for the action described by an activity rectangle

Activity diagram for access camera surveillance — display camera views function




Homeowner
Camera
Interface
Enter password and user ID
Invalid passwords/ID
Valid passwords/ID
Select major function
Prompt for reentry
Other functions
Select surveillance
Input tries remain
No input tries remain
Thumbnail view
Select a specific camera
Select specific Camera thumbnails
Select Camera icon
Generate Video output
View camera output In labelled window
Prompt for Another view
exit
See another camera