Domain Scenarios

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Domain Scenarios

What

a real or imaginary sequence of events happening in the World.

Why

1. To facilitate discussions with stakeholders.
2. To discover how stakeholders see and talk about the world.
3. To discover example of desired and undesired behaviours.
4. To illustrate general properties with concrete examples.

Who: All stakeholders

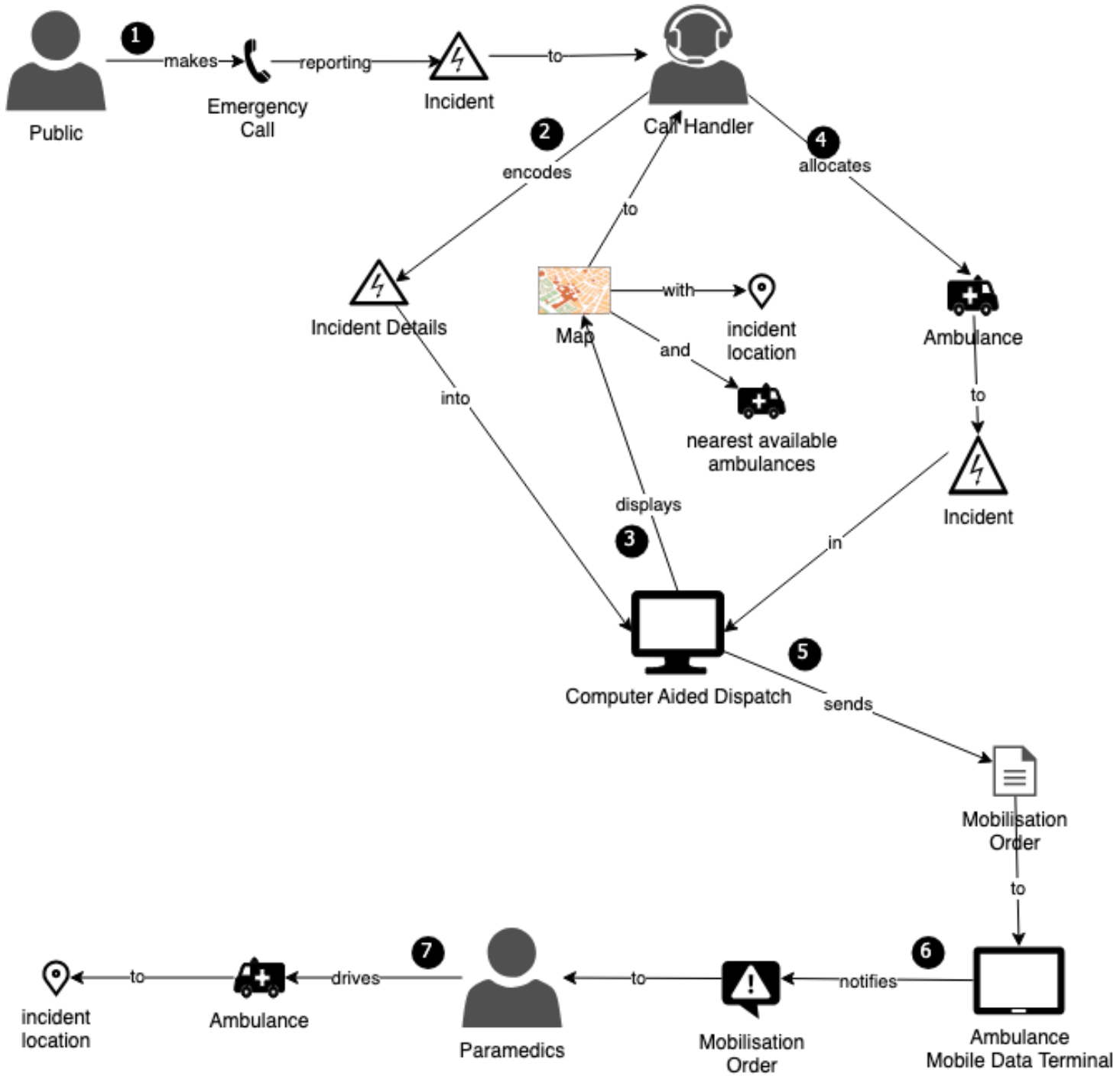
When: Mostly during investigation

Scenario an ambulance responds to an emergency call

1. A member of the public makes an emergency call to report an incident to a call handler.
2. The call handler encodes the incident details into the Computer Aided Dispatch (CAD) system.
3. The CAD displays a map with the incident location and nearest available ambulances to the call handler.
4. The call handler allocates an ambulance to the incident in the CAD.
5. The CAD sends a mobilisation order to the ambulance's Mobile Data Terminal (MDT).
6. The MDT signals the mobilisation order to the ambulance paramedics.
7. The paramedics drive the ambulance to the incident location.

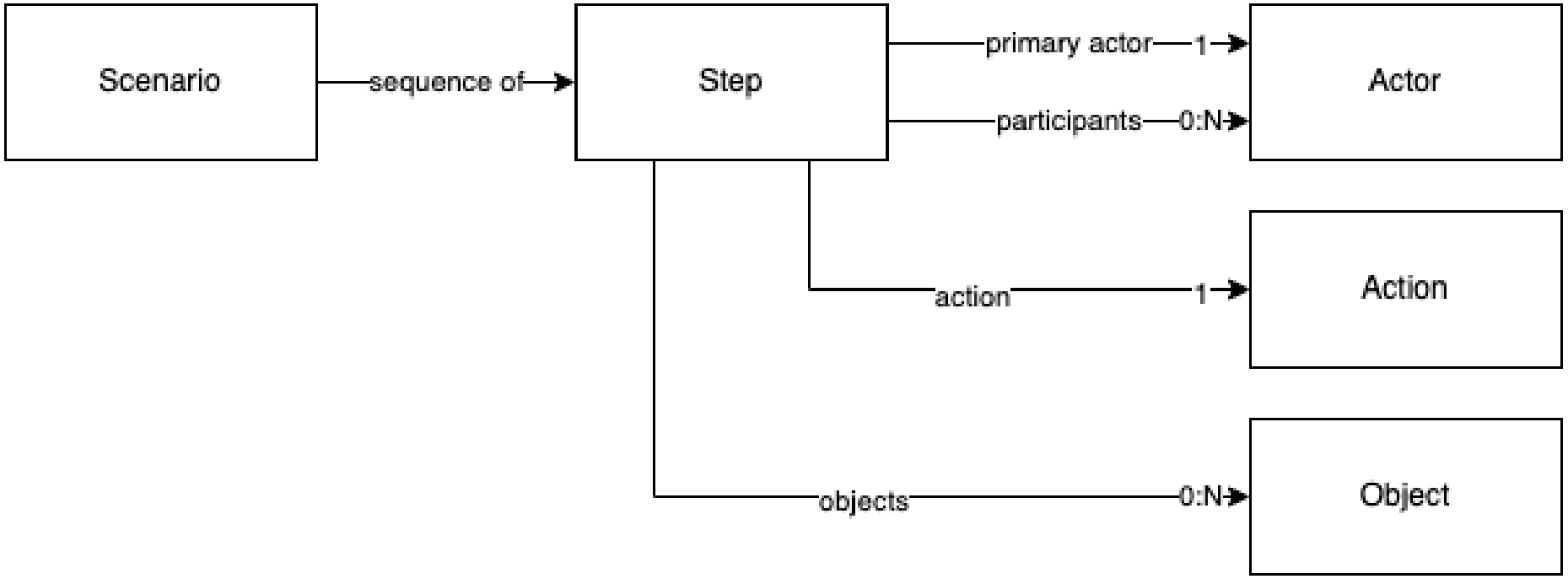
Graphical notation (domain story)

Used during domain storytelling interviews and workshops



Concepts & Notations

Basic Elements of a Domain Scenario



Step example:

A member of the public makes an emergency call to report an incident to a call handler.

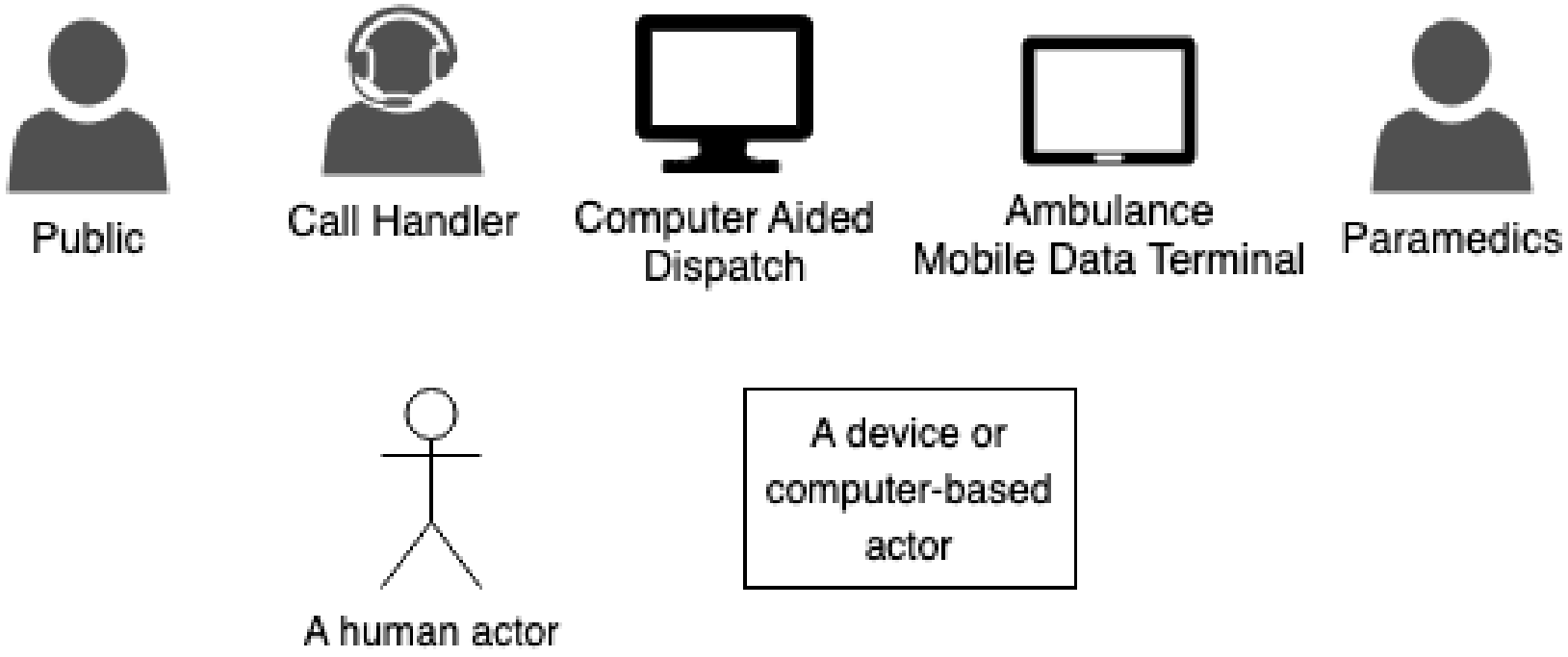
[primary actor] [action] [object] [object] [participant]

Actors

An actor is an entity that performs actions in the World.

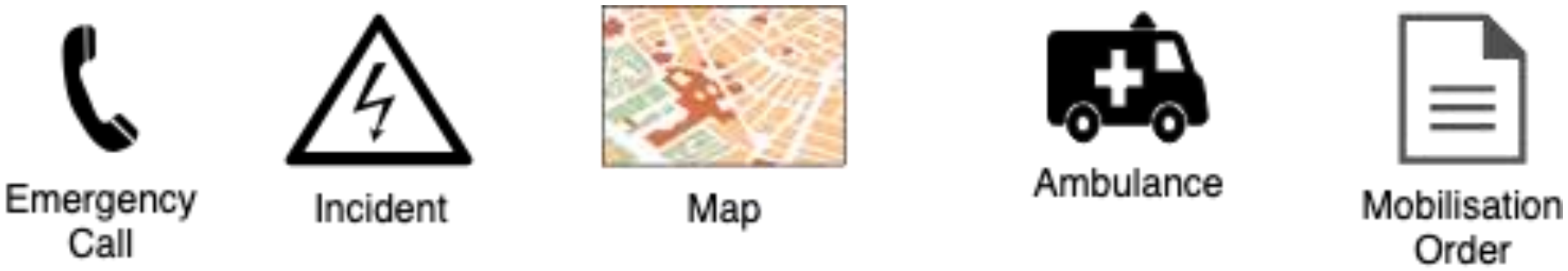
An actor can be a person, an organisation, a device, or a software system.

The machine is an actor.

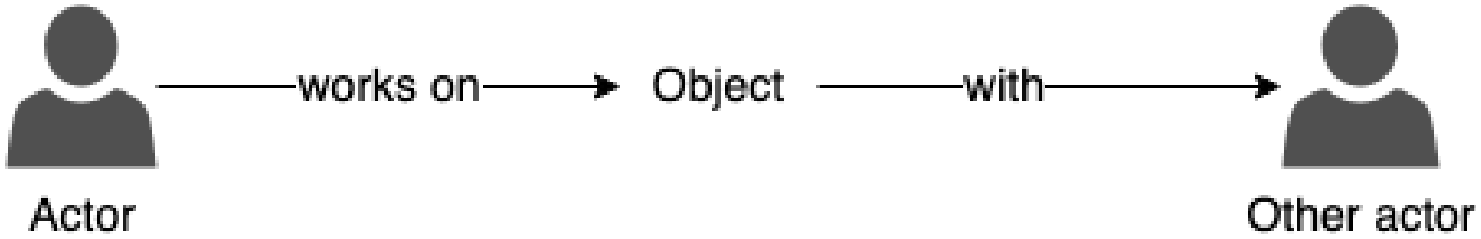


World Objects

A world object is an entity that is manipulated, observed, or talked about by actors.
An object can be a physical thing or information about physical things.



Icons are optional



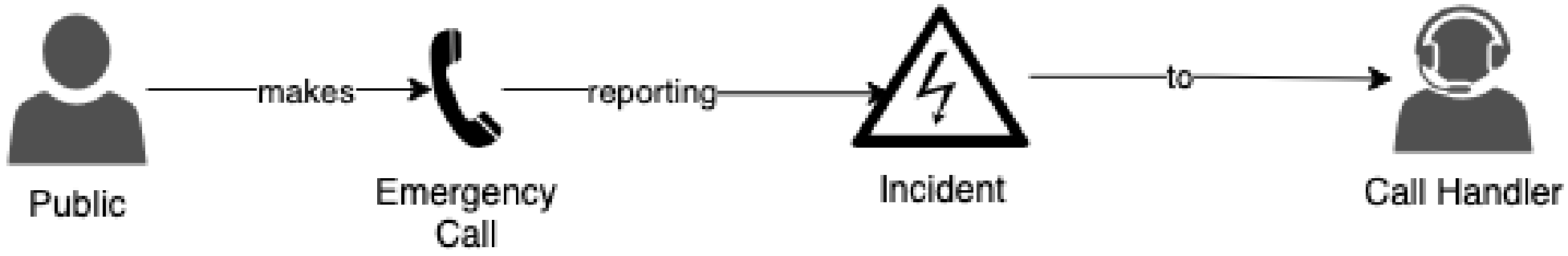
Actions and steps

An action is what the primary actor does. It is described a verb.

A step is a sentence in the active voice that describes

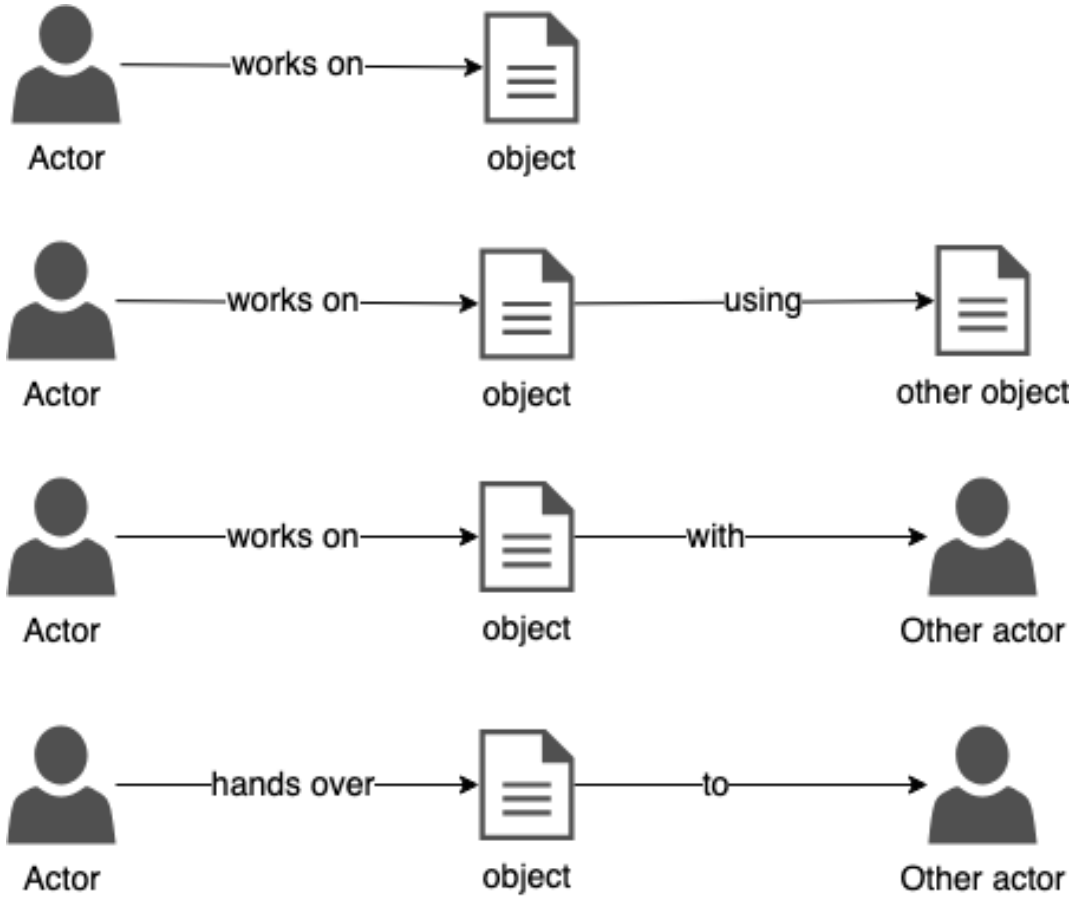
who does what with what and *with whom*.

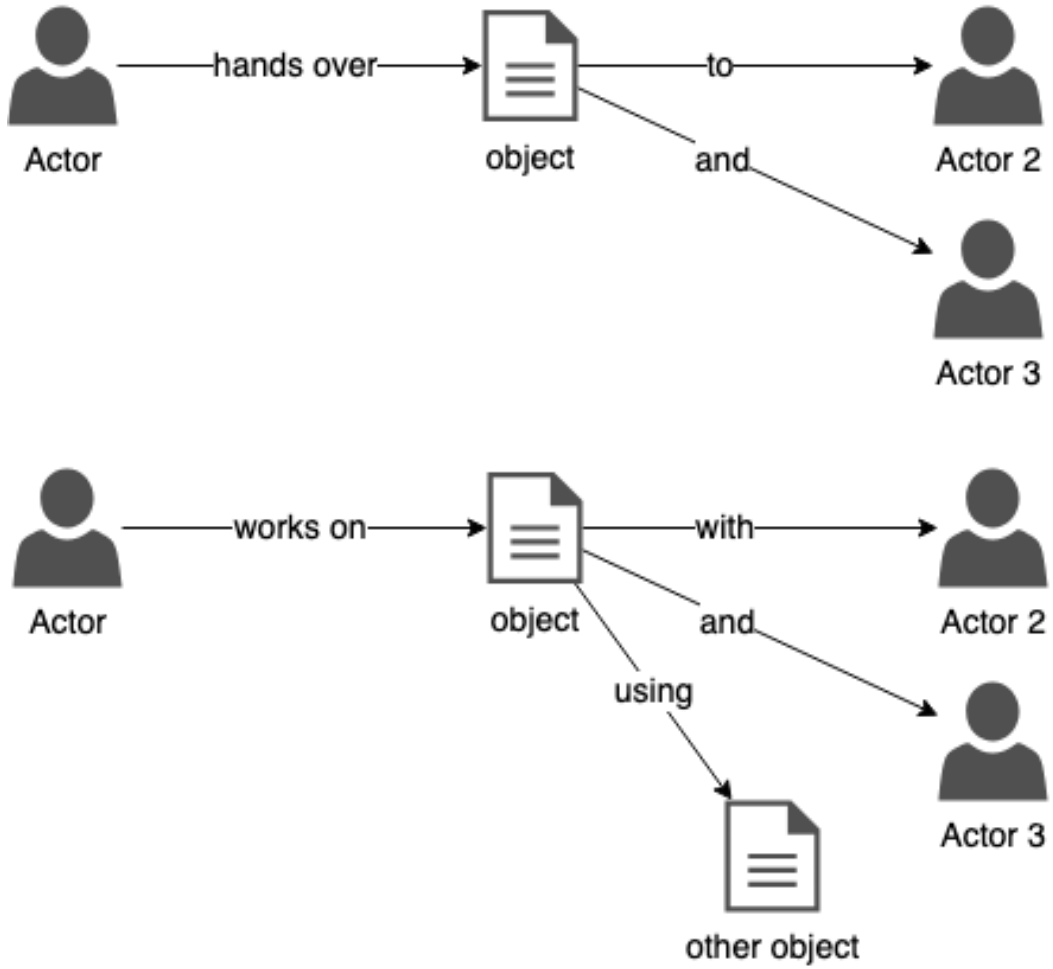
(primary actor) (action) (objects) (participants).



A member of the public makes an emergency call to report an incident to a call handler.

Some sentence structures





Sequence of steps

Steps are numbered in chronological order.

- Steps may overlap; the next step might start before the previous has ended.

A scenario has no conditionals, no branching and no loops!

- If needed, use more expressive models: activity diagrams and state machines
- Later, we will see shorthand notation to describe *a few* variants and exceptions in concise way.

Other Scenario elements

Title

a short name describing the scenario's content.

Tip: "this is a scenario where <title>"

Context (synonym: precondition)

state of the World at the start of the scenario

Outcome (synonym: postcondition)

state of the World at the end of the scenario

Scenario an ambulance responds to an emergency call

Context: An incident has just occurred.

Outcome: A first ambulance arrives at the incident scene.

1. …
2. …
3. …

Types of Scenarios

As-is *vs.* to-be

sequence of events for the World-as-is and to-be, respectively.

Positive *vs.* negative

desired and undesired sequence of events, respectively.

a scenario can be positive for some stakeholders and negative for others.

Normal *vs.* alternative *vs.* exceptional

normal = default, typical way to satisfy some stakeholder goal.

alternative = a variant to the normal scenario.

exceptional = a variant where some undesired event occurs.

Three Notations

1. Textual scenarios

✓ easy to write.

✗ easier to make mistakes (no primary actor, missing object, scenario too long).

2. Domain stories

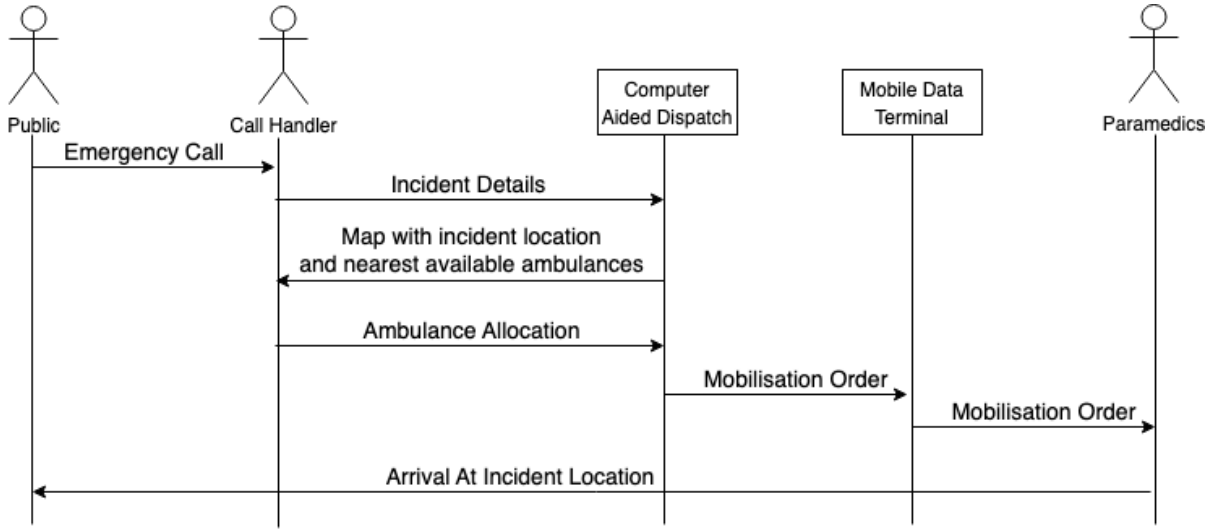
✓ engaging visual structure, designed for collaborative modelling.

✗ harder to create and maintain than text.

3. Sequence Diagrams

✓ formal, automated tool support.

✗ less stakeholder-friendly, more for software architecture and design than requirements.

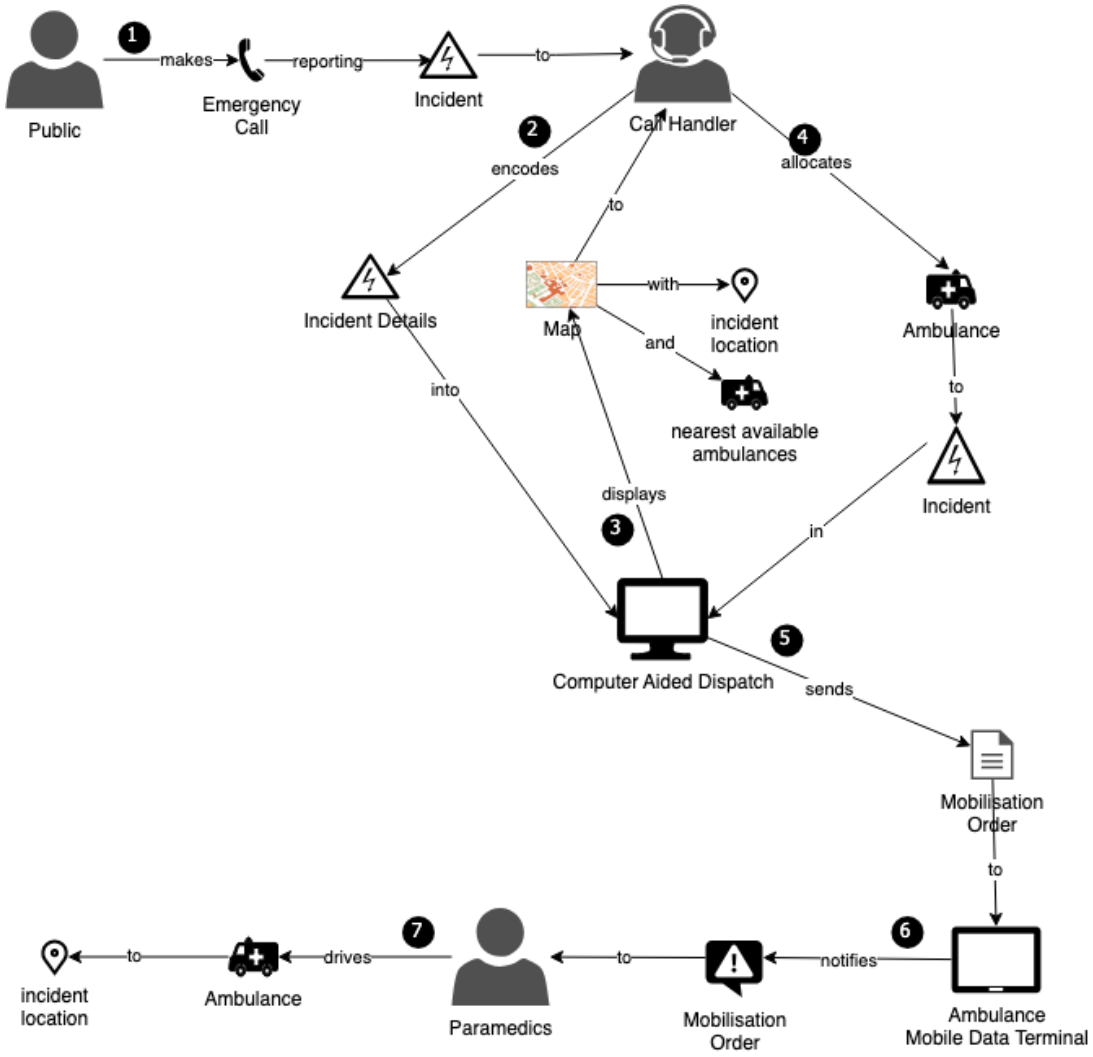


Domain Story

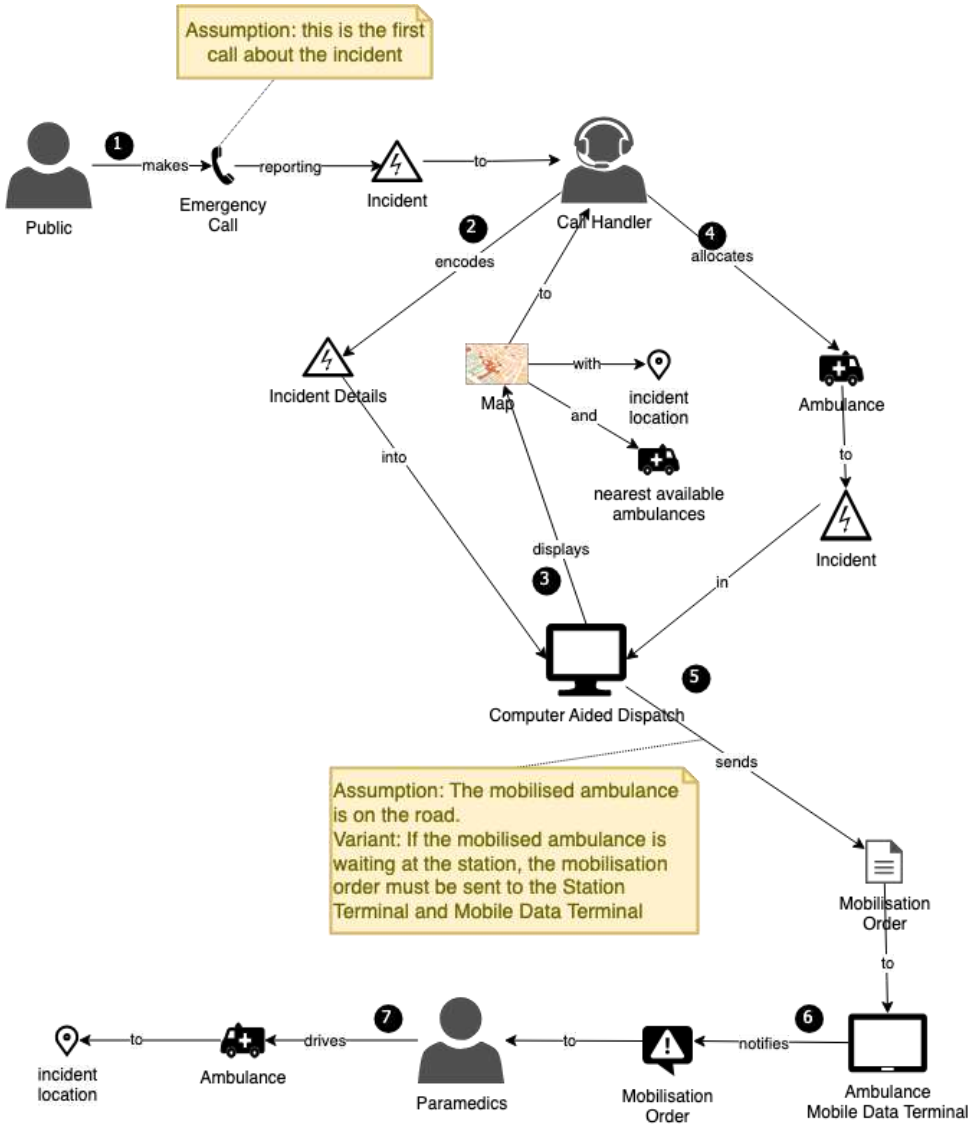
1. Each actor appears only once.
   (I occasionally violate that rule)
2. Each step has its own world objects.

Guidelines

- keep the set of icons small and simple.
- Draw actors larger than objects.
- Use different icons for actors and objects.
- Use annotations to add information



Annotations



Scenario an ambulance responds to an emergency call

Context: An incident has just occurred.

Outcome: A first ambulance arrives at the incident scene.

1. …
2. …

…

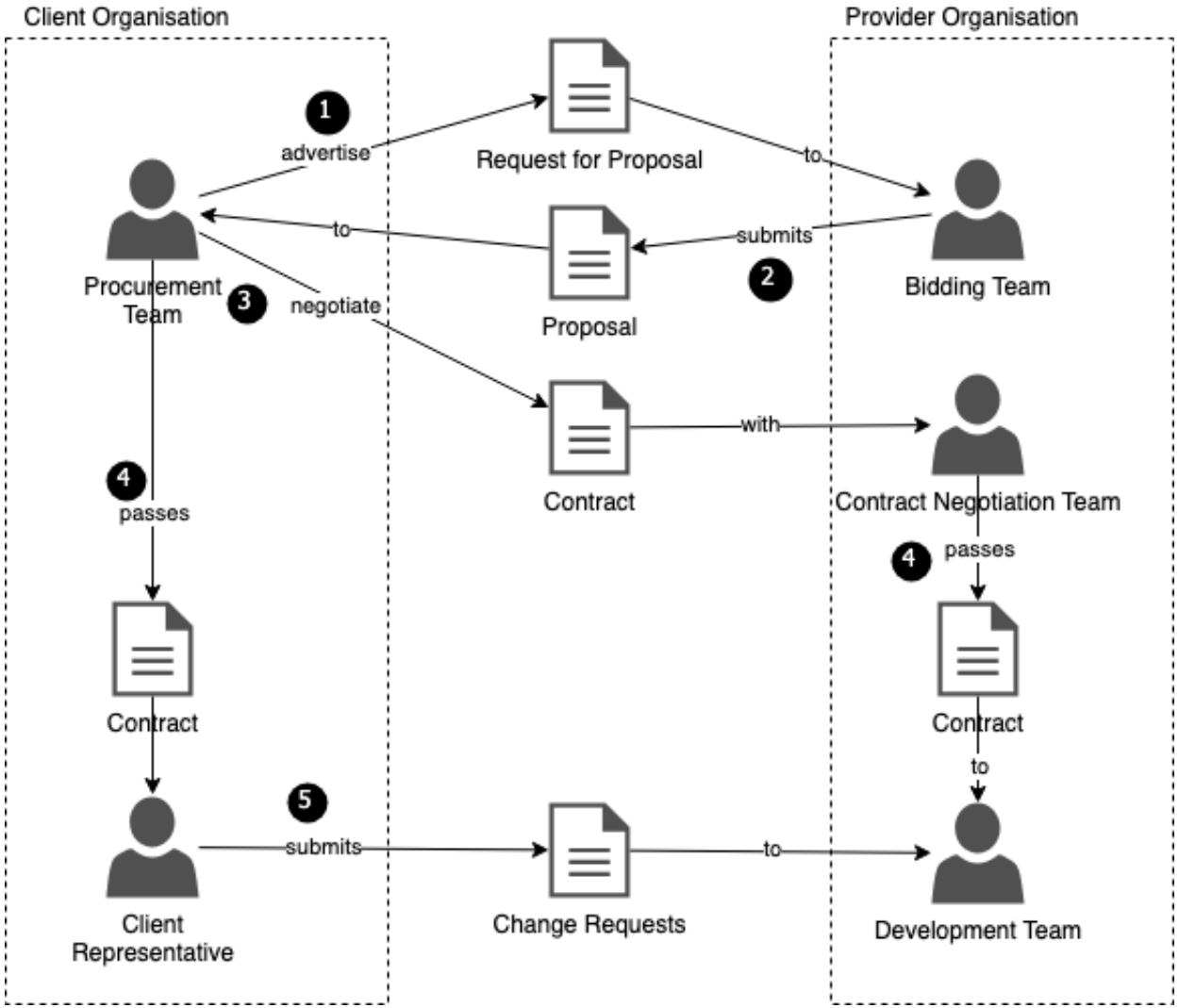
Notes

- In step 1, the emergency call is the first call reporting the incident.
- In step 5, the mobilised ambulance is on the road. If the mobilised ambulance was waiting at the station, the mobilisation order would have to be sent to the Station Terminal as well as the Mobile Data Terminal.

Structuring Scenarios

1. Showing organizational boundaries
2. Structuring scenarios into parts
3. Describing Variants and Exceptions

Showing Organizational Boundaries



Tendering process in client projects

Structuring Scenarios into Parts

Scenario an ambulance responds to an emergency call

Part I: Call Taking

1. A member of the public makes an emergency call to report an incident to a call handler.
2. The call handler encodes the incident details into the Computer Aided Dispatch (CAD) system.

Part II: Ambulance Allocation

3. The CAD displays a map with the incident location and nearest available ambulances to the call handler.
4. The call handler allocates an ambulance to the incident in the CAD.

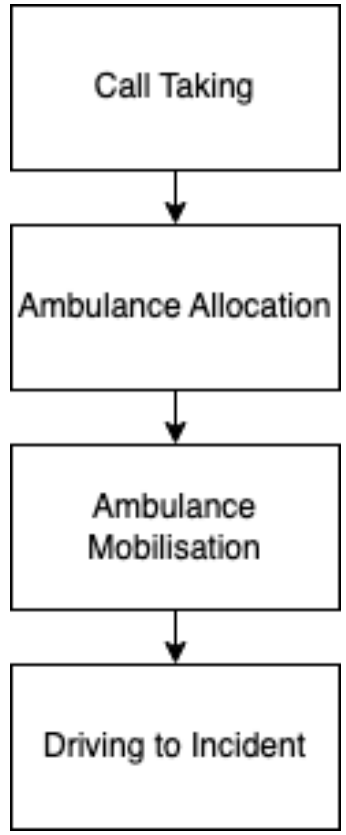
Part III: Ambulance Mobilisation

5. The CAD sends a mobilisation order to the ambulance's Mobile Data Terminal (MDT).
6. The MDT signals the mobilisation order to the ambulance paramedics.

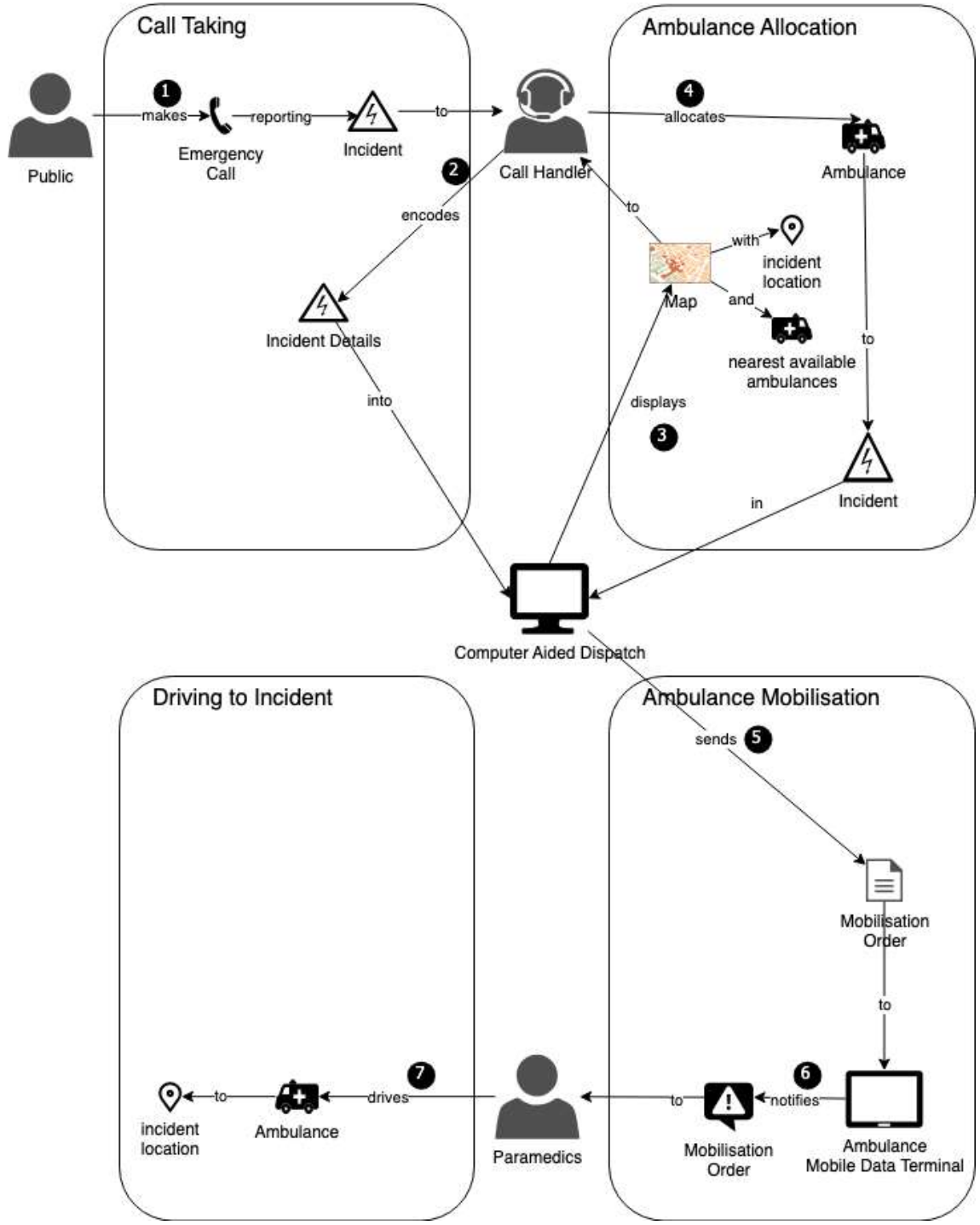
Part IV: Driving to Incident

7. The paramedics drive the ambulance to the incident location.

Scenario Outline Graph



Scenario Parts in a Domain Story



Variants and Exceptions in Textual Scenarios

Scenario an ambulance responds to an emergency call

Part I: Call Taking

Part II: Ambulance Allocation

3. The CAD displays a map with the incident location and nearest available ambulances to the call handler.
4. The call handler allocates an ambulance to the incident in the CAD.

Part III: Ambulance Mobilisation

5. The CAD sends a mobilisation order to the ambulance's Mobile Data Terminal (MDT).
6. The MDT signals the mobilisation order to the ambulance paramedics.

Part IV: Driving to Incident

7. The paramedics drive the ambulance to the incident location.

Alternative Flows

Variant: Mobilisation of ambulance waiting at station

5.a. If the allocated ambulance is waiting at an ambulance station:

1. The CAD sends a mobilisation order to the ambulance's Mobile Data Terminal (MDT) *and to the station's terminal*
2. The paramedics see the mobilisation order on the station display.

Continue to step 7 of main scenario.

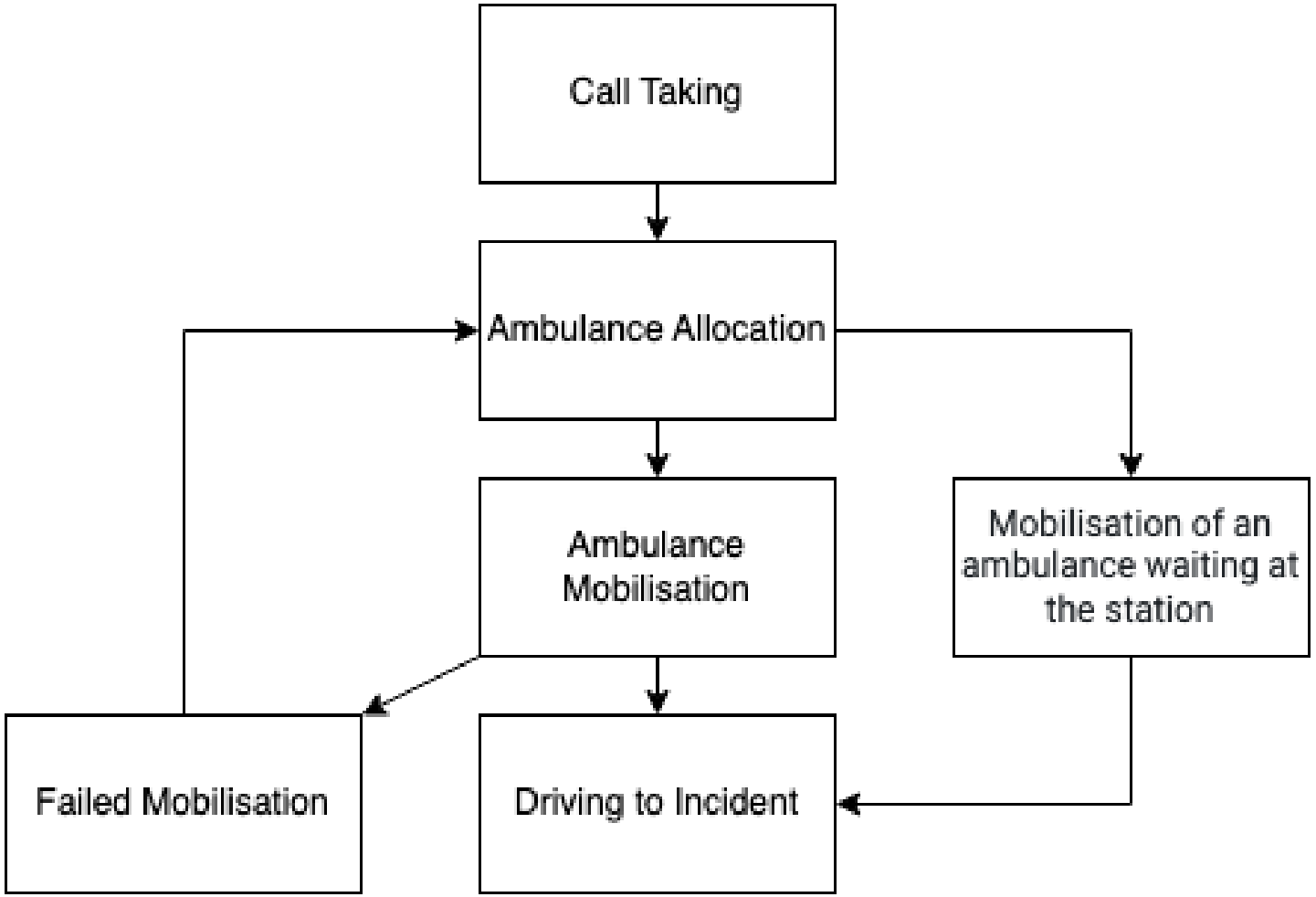
Exception: Failed Mobilisation

7.a. If the ambulance does not respond to the mobilisation instruction within 3 minutes:

1. The CAD signals a failed mobilisation to a call handler

Go back to step 3 of main scenario

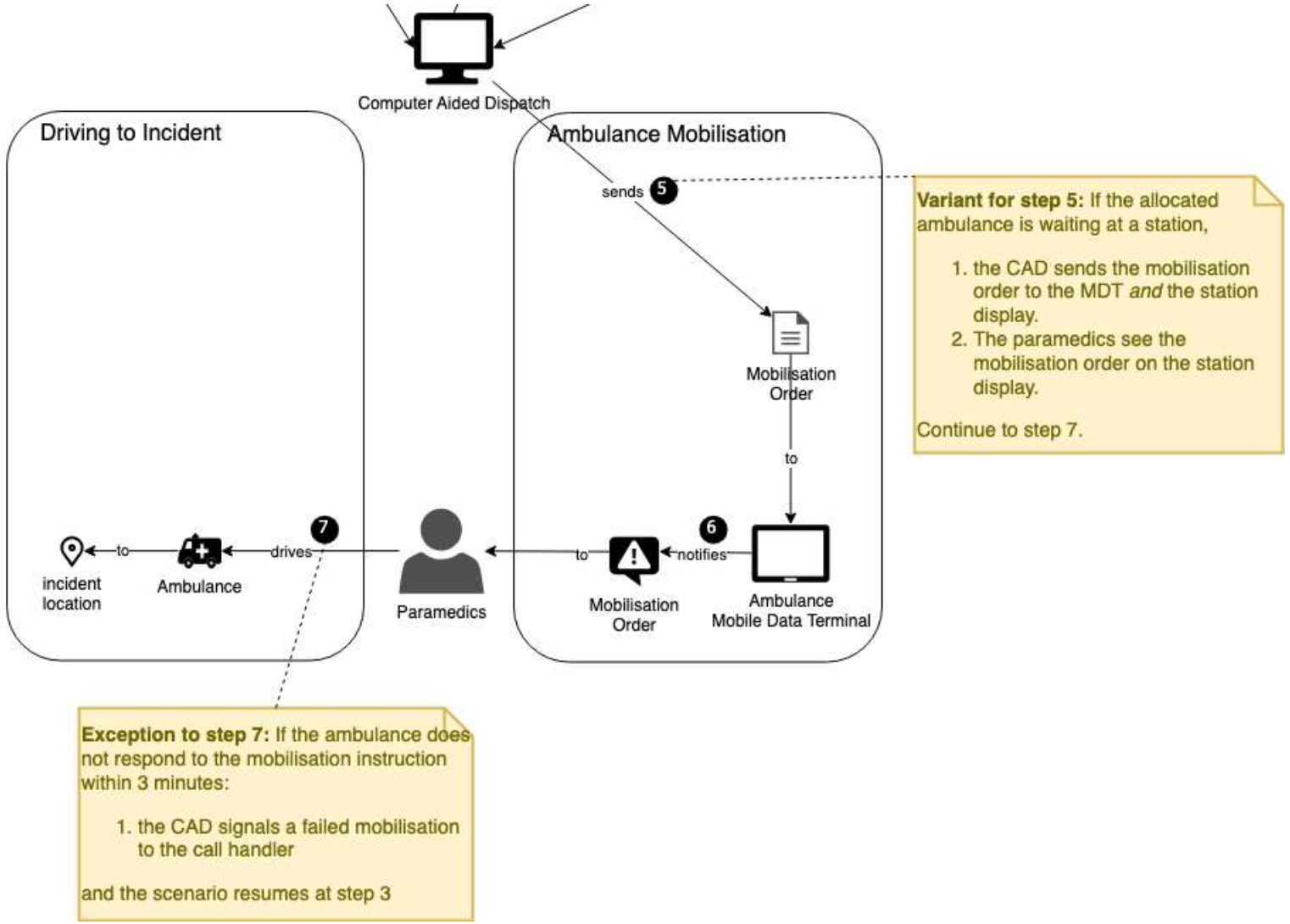
Scenario Outline Graphs



Caution: describe a few variants and exceptions only.

Use activity diagram or state machine to describe full set of behaviours.

Variants and Exceptions in Domain Stories



Caution

Describe a few variants and exceptions only

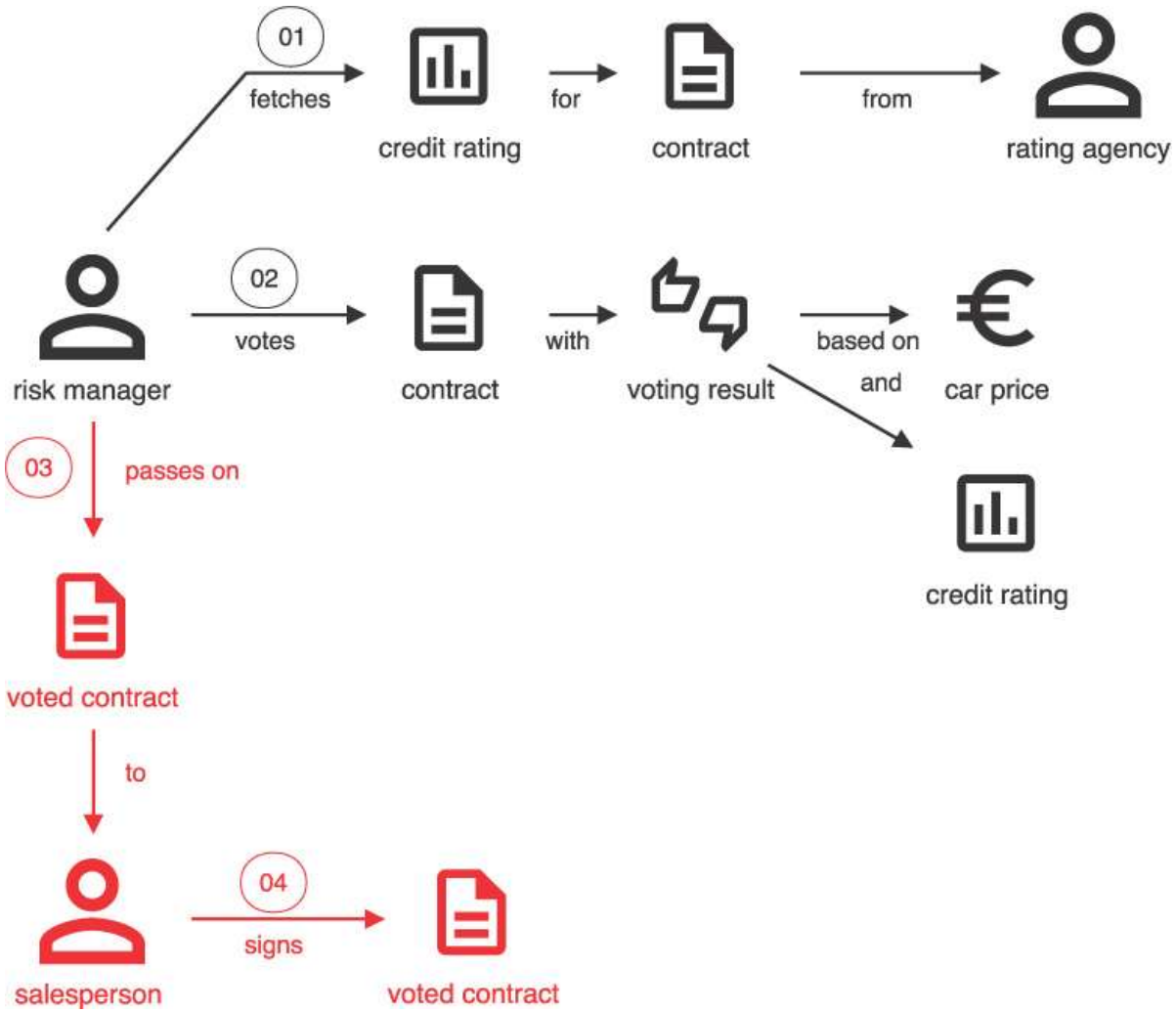
- Do not attempt to be exhaustive; scenario notations are not well suited for this
- For more complete models, use other notations: activity diagrams, state machines, goal models. Scenarios are starting points for creating these models.
  - scenarios are starting points for creating more complete models

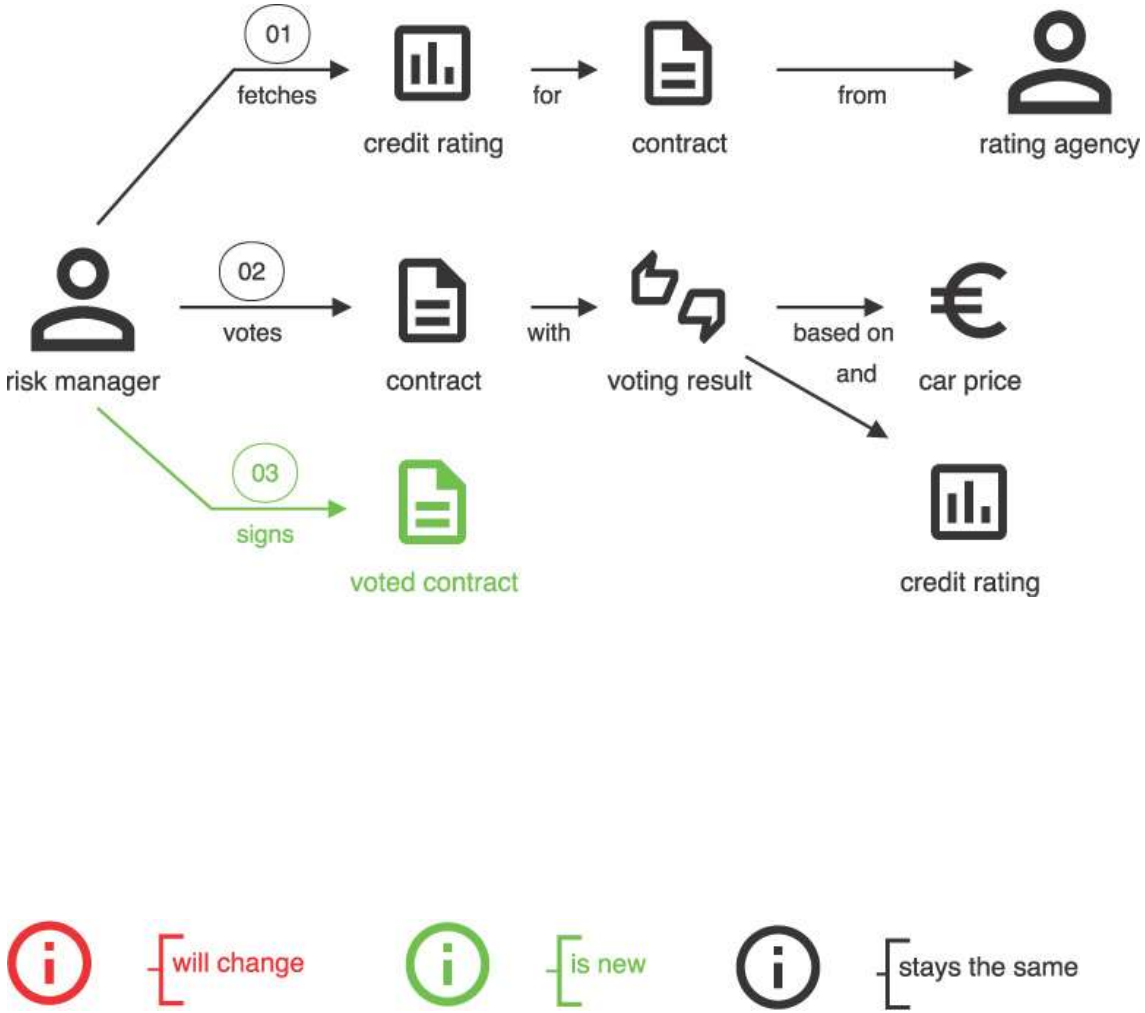
Do not mix scenarios for the World-as-is and to-be

- Variants are alternative flows *for the same world* (as-is or to-be)
- If needed, write scenario for world as-is and world to-be separately, and higlight changes.

Example from the book: Domain Storytelling by Hofer and Schwentner, 2021

Showing changes between as-is and to-be





Relations to Other Models

Scenarios are related to

Context diagrams

- same actors and actor interactions.

Domain concept models

- scenario objects are related to entities.

Goal models

- scenarios illustrate stakeholder goals and obstacles (goal violation).

State machines & process models

- a positive scenario is one execution of a state machine or process model.
- a negative scenario is an example of execution not allowed by the state machine or process model.

Modelling Guidelines

General Guidelines

Remember your objective

modelling alone for your own understanding

vs. collaborative modelling for shared learning and understanding

vs. modelling for explaining.

Aim for clarity

scenarios must be engaging and easy to read for your stakeholders.

Do not aim for completeness

a few illustrative examples are enough.

a single scenario does not show all events happing in the world.

General Process

1. Choose a starting event

- an event that requires some response, either
  - triggering event of a goal to be illustrated
  - incoming event across the world boundary (see initiation phase)

2. Ask what happens next

- different and easier for scenarios as-is than scenarios to-be
- keep the first pass simple (don’t get bogged down in details), revise later
- continue until goal is satisfied or failed, or until exiting the world boundary

3. Add a few variants and exceptions if needed

- aim for representative sample, not completeness

Structure Scenarios with Goals (1/4)

Each scenario has a storyline

A scenario is not an aimless sequence of events. Each scenario illustrates how some stakeholder goal is achieved or failed.

> ***Example**: stakeholder goal = when an incident is reported, an ambulance must arrive at the incident scene as quickly as possible.*

Start at the beginning; stop when the goal is achieved or failed.

The first step is the goal's triggering event (a world event that triggers a need for a response), the last step is an event indicating that the goal is achieved or failed.

> ***Example**:*
>
> *first step: a member of the public reports an incident.*
>
> *last step: the ambulance arrives at the incident scene.*
>
> *Do not include what happens next, i.e. attending to the injured and bringing them to hospital.*

Structure Scenarios with Goals (2/4)

Keep to the story storyline ("avoid incidental details")

All steps must be important to explain how the goal is achieved or failed. Steps that are unrelated to the goal should not be included.

> ***Example**: our ambulance response scenario does not include steps where the call handler logs into CAD, the paramedics start their shift, the CAD updates ambulance's location information from GPS messages, etc.*

Events happening during the scenario but not important to the storyline (the goal satisfaction or failure) should not be included. A scenario is only a partial description of what is happening in the world.

Structure Scenarios with Goals (3/4)

Move the story forward ("choose the right level of details/abstraction")

Each step must make significant progress towards the goal's achievement or failure; do not write long sequences of tiny steps relative to the goal.

> ***Example**: Our scenario describes call taking in two steps (a caller reports the incident, a call hander encodes details into the CAD), not as a long sequence of call handler's questions, caller's responses and call handler's inputs into CAD.*

Structure Scenarios with Goals (4/4)

Group scenarios by stakeholder goal

A single goal may be illustrated by more than one scenario

- scenarios as-is and to-be
- variants and exceptions in the same world (as-is or to-be)
- multiple main scenarios in the same world

Common Mistakes

Scenario is too long

If a scenario becomes too long (more than 9 steps), consider

- removing steps that are irrelevant to the goal (“keep to the storyline”)
- replacing a series of tiny steps by one more coarse-grained step (“always move forward”)
- removing steps by adding information to the context or as annotations.

Keep all steps in the scenario at the same level of details.

Missing primary actor (in textual step)

Don’t write steps in the passive voice

Scenario an ambulance response to an emergency call

1. the call is received.
2. incident details are recorded.
3. a map with the nearest available ambulance is displayed.
4. …

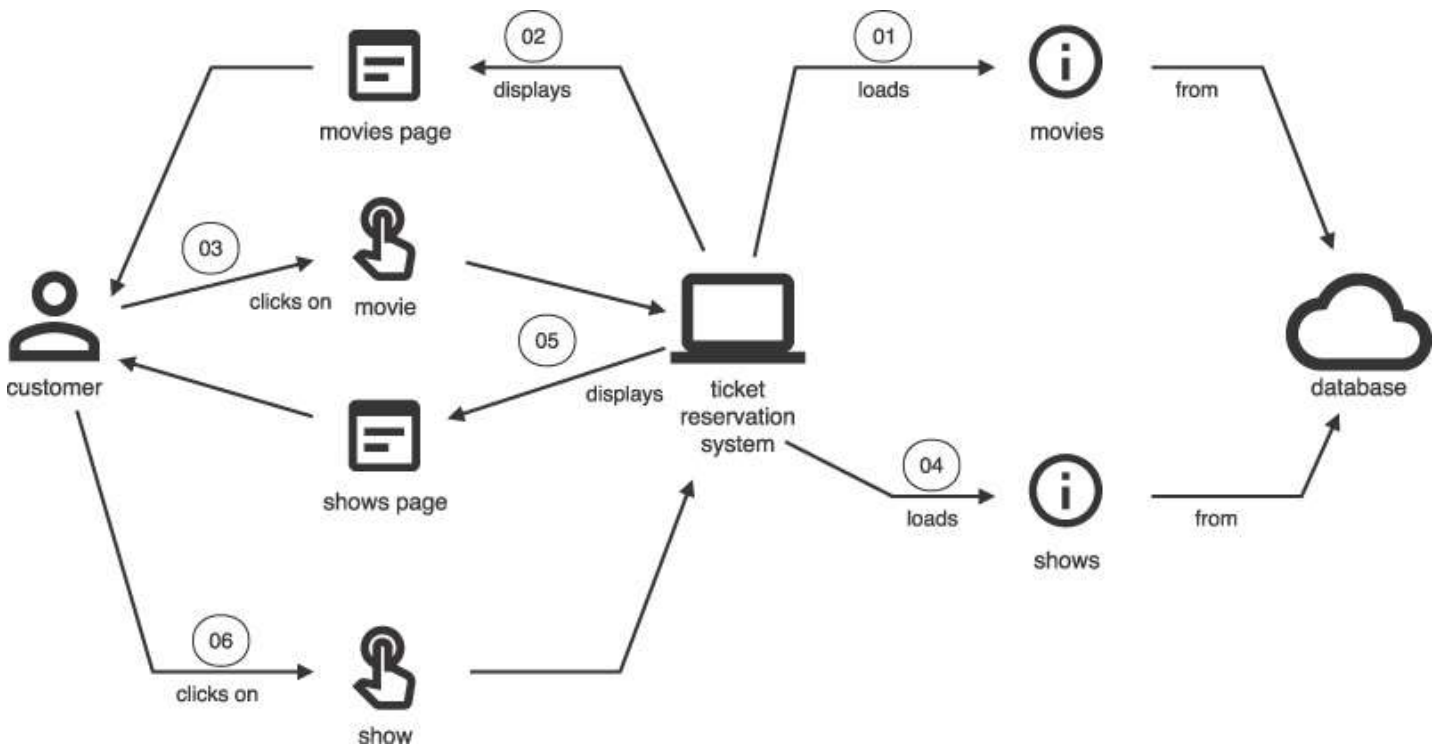
Use the active voice

Scenario an ambulance responds to an emergency call

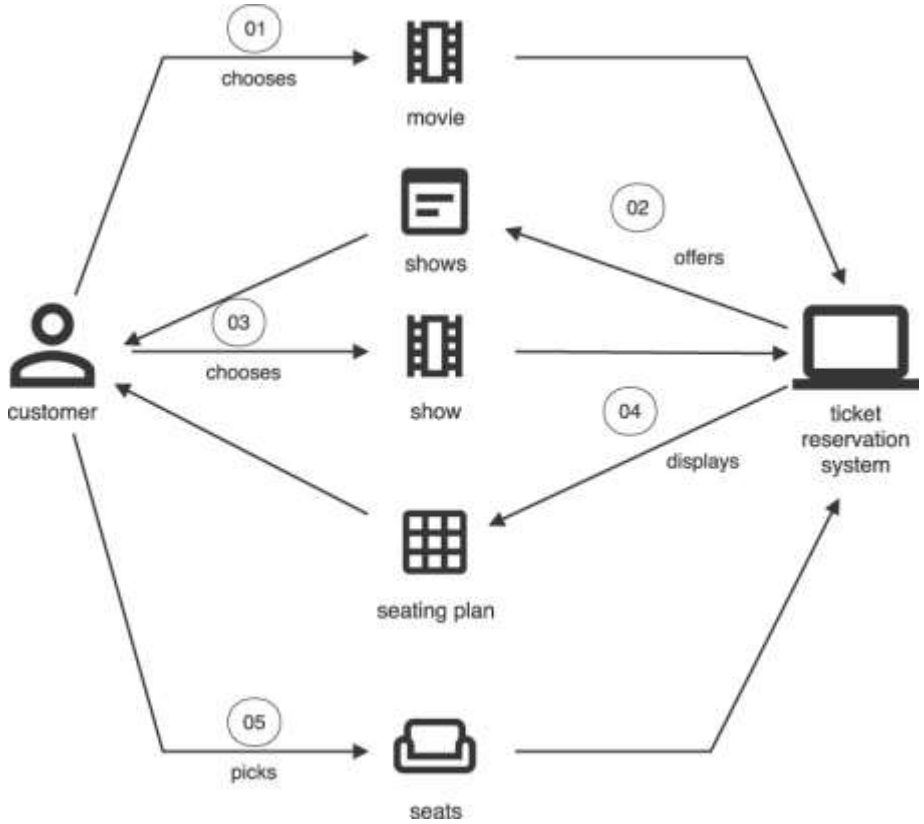
1. A member of the public makes an emergency call to report an incident to a call handler.
2. The call handler encodes the incident details into the Computer Aided Dispatch (CAD) system.
3. The CAD displays a map with the incident location and nearest available ambulances to the call handler.
4. …

Scenario describes the implementation, not the domain

Don’t describe scenarios how the implementation team sees them

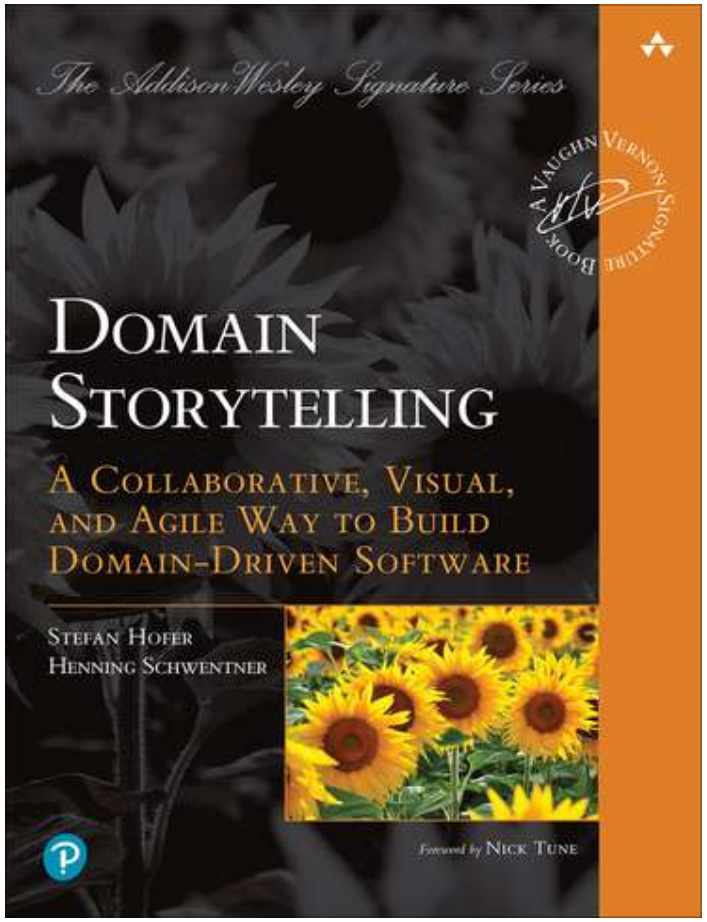


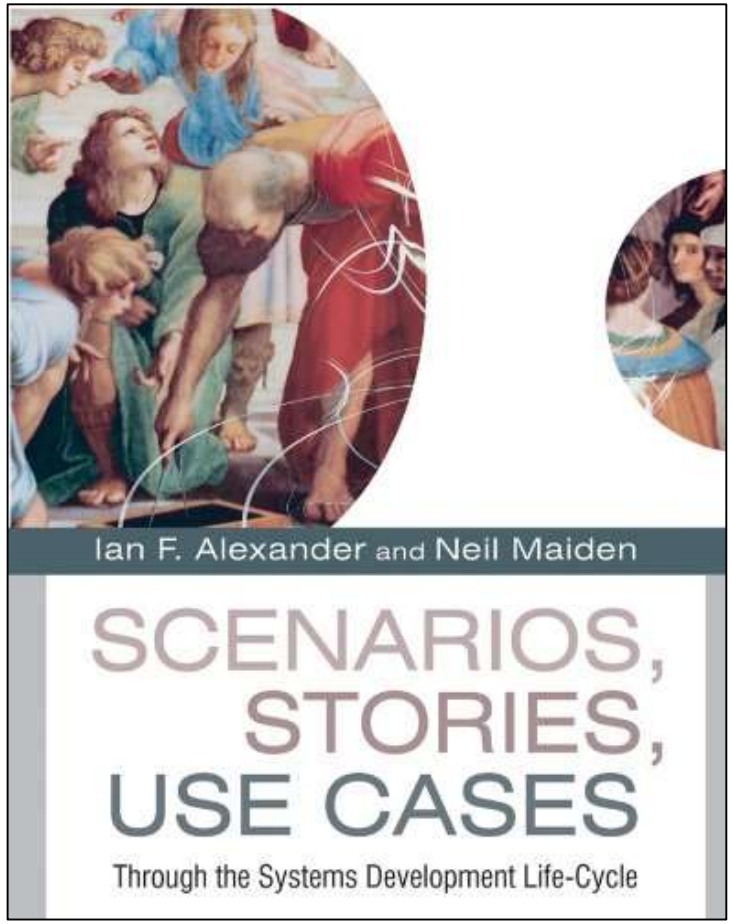
Describe scenarios from point of view of stakeholders



Example: Movie ticket reservation system, from Hofer and Schwentner, Domain Storytelling, 2021

Further readings





Exercises

Congestion Charge System

Write or sketch scenarios illustrating the goals:

1. Goal Achieve [Congestion Charged Paid On Time]
2. Goal Achieve [PCN Sent When CC Not Paid]