Context Diagrams

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Context Diagrams

What

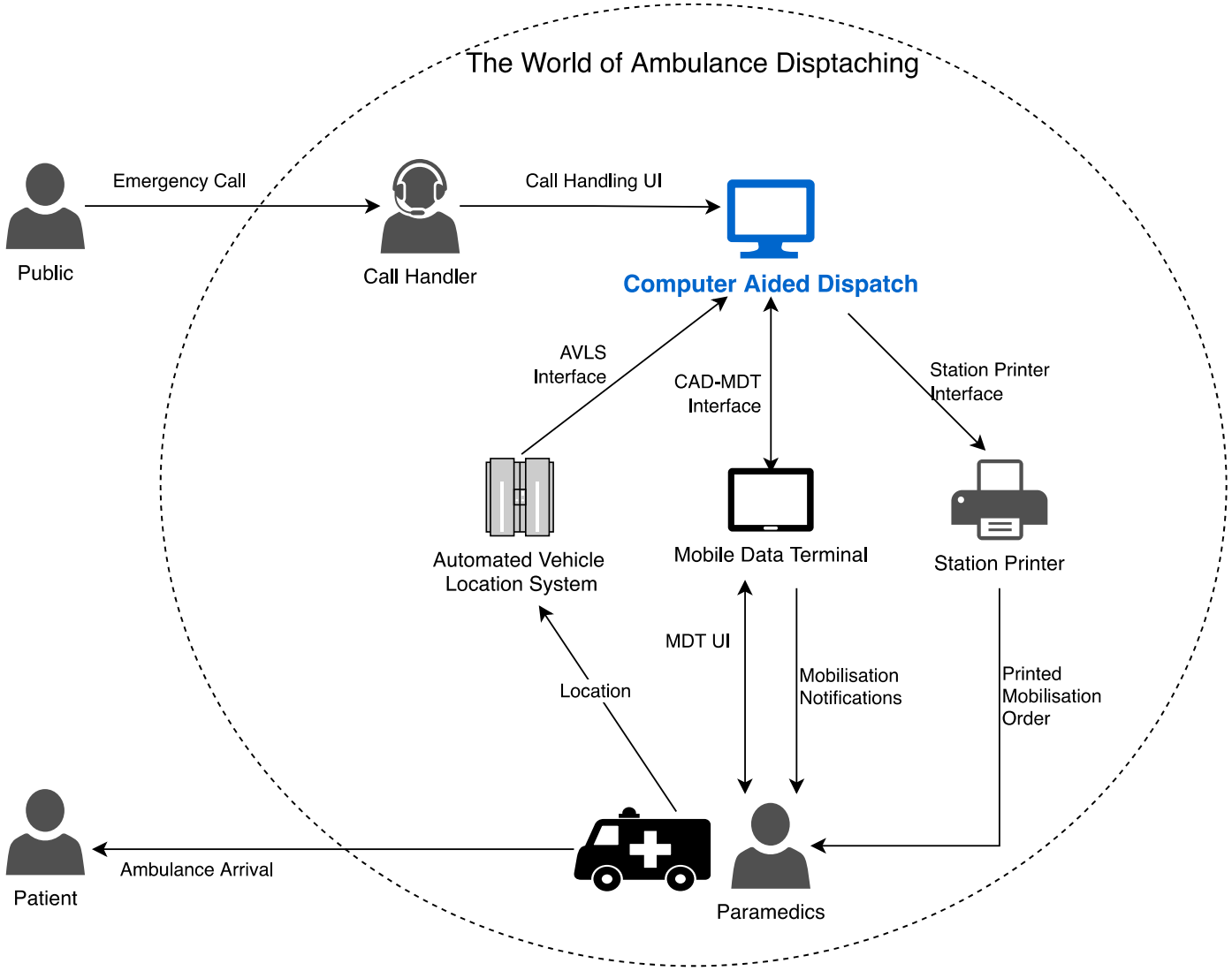
Shows the World as a set of actors connected through interfaces.

Why

1. Defining the scope of requirements investigations.
2. Visualise the context in which the machine operates.
3. Visualising the Machine inputs and outputs

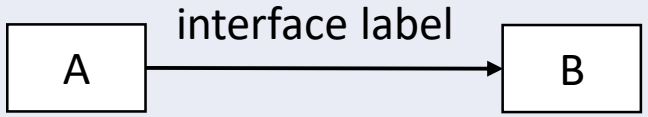
Who: Requirements engineers, software architects, all stakeholders.

When: All phases.



Concepts & Notations

Basic Elements

Concept	Notation	Meaning
Actor		An entity that can control and observe and control phenomena.
Interface		A place in the World where two actors interact through shared phenomena. Interactions are initiated by actor A.
Work Boundary		Marks the boundary between the Work to be supported and adjacent systems.

Actors

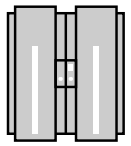
An actor is an entity that can control and observe phenomena. An actor can be a person, an organisation, a device, or a software system. The machine is an actor.

Icon notation

Public

Call Handler

Computer Aided Dispatch

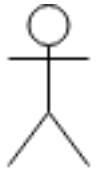


Automated Vehicle Location System

Mobile Data Terminal

Station Printer

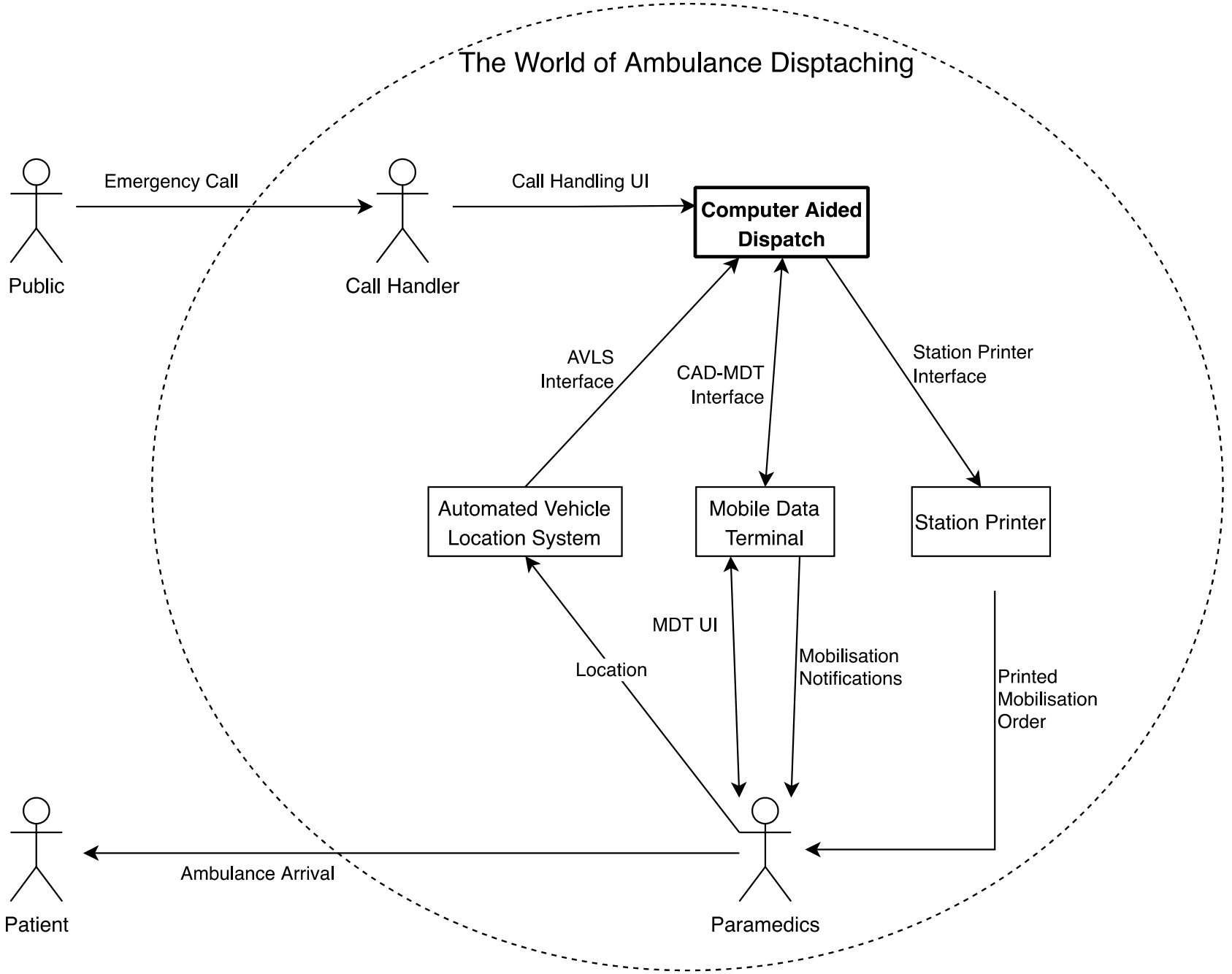
Traditional stick figure and box notation



A human actor

A device or computer-based actor

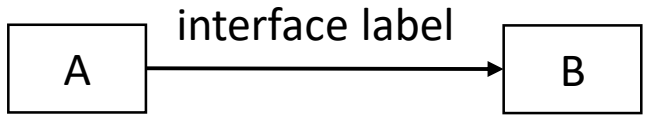
Context diagram in traditional box notation



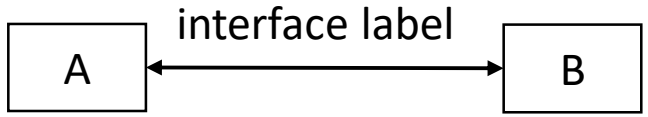
Interfaces

An interface is a place in the World where two actors interact through shared phenomena.

Graphical notation



Interactions along the interface are initiated by A.

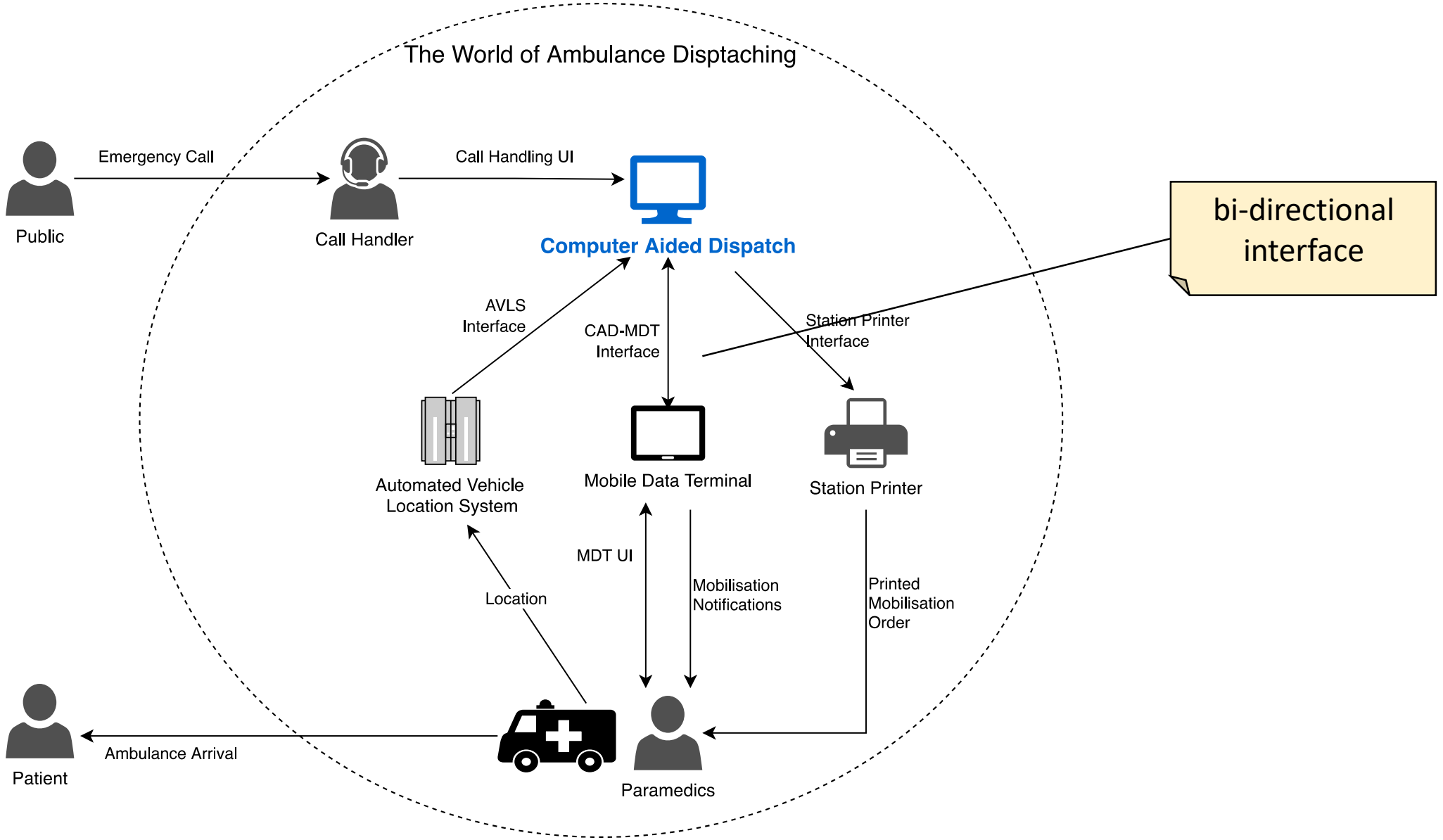


Some interactions initiated by A, others by B.

Interface specification

- label: a short name for the interface
- content: the set of phenomena located at that interface between A and B

Example


The World of Ambulance Disptaching
Public
Emergency Call
Call Handler
Call Handling UI
Computer Aided Dispatch
bi-directional interface
AVLS Interface
CAD-MDT Interface
Station Printer Interface
Automated Vehicle Location System
Mobile Data Terminal
Station Printer
MDT UI
Location
Mobilisation Notifications
Printed Mobilisation Order
Patient
Ambulance Arrival
Paramedics

Relations to Other Models

Context Diagrams are related to

Domain scenarios

- same actors; consistent actor interactions.

Domain concept models

- phenomena in interfaces are related to entities, attributes and associations.

Goal models

- same actors.
- top-level project goals defined in terms of world inputs and outputs.
- machine requirements defined in terms of machine inputs and outputs.

Modelling Guidelines

Modelling Guidelines

General

Use terms of the application domain, not software engineering technologies.

During initiation phase

Focus on clarifying the Work boundary (the project scope); intentionally hide what happens inside.

During investigation and decision

Keep stakeholders engaged; sketch context diagrams for the World-as-is and to-be that reflect and clarify how *they* see the world.

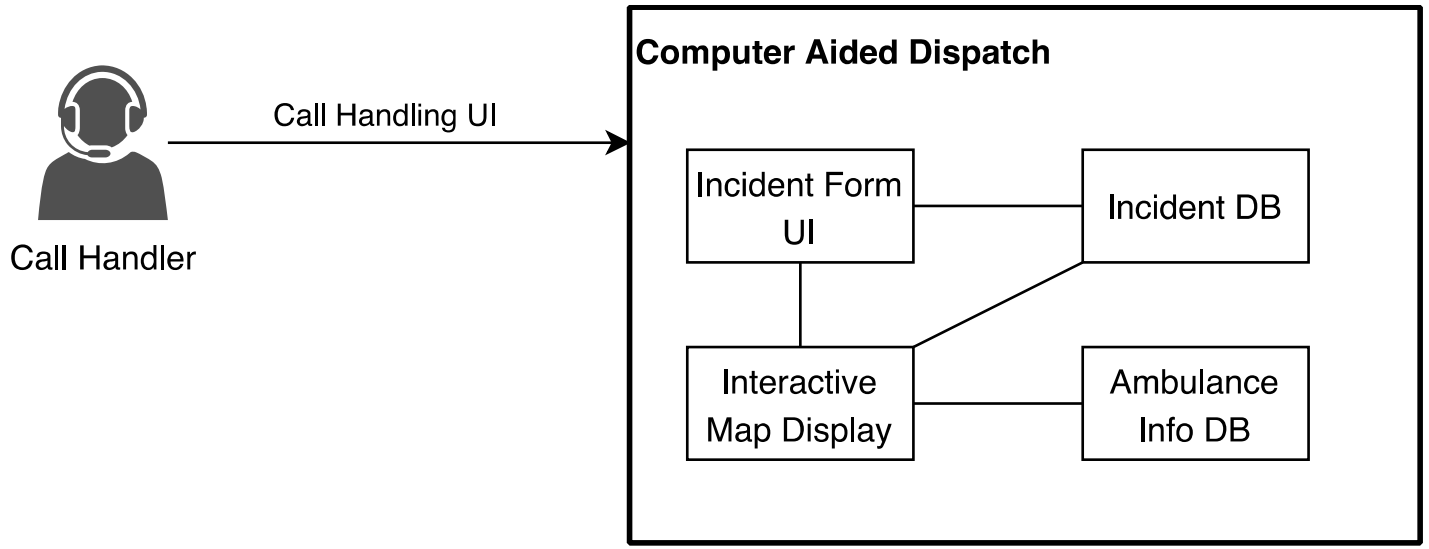
During formulation, validation and development

Check for completeness of machine inputs and outputs; identify missing machine interfaces. If useful, define interface specifications.

Common Mistakes

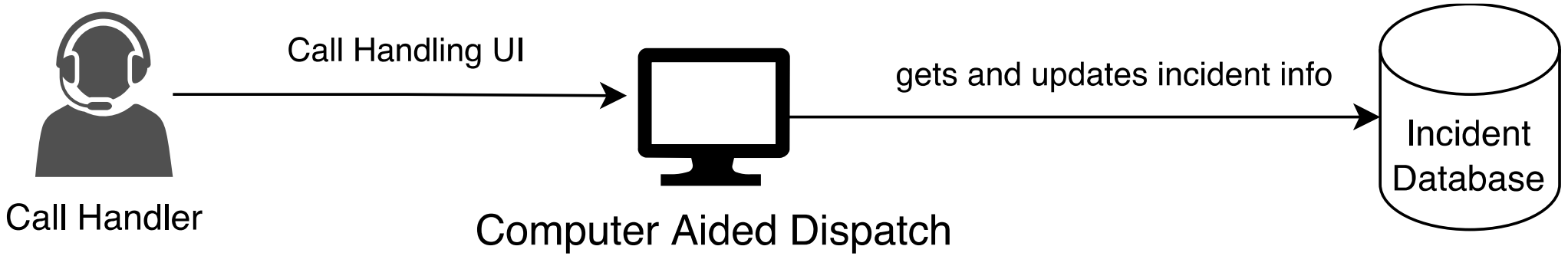
Mistake 1: Showing what's inside the machine

Don't use the context diagram to model the software architecture



Draw a separate architecture model instead.

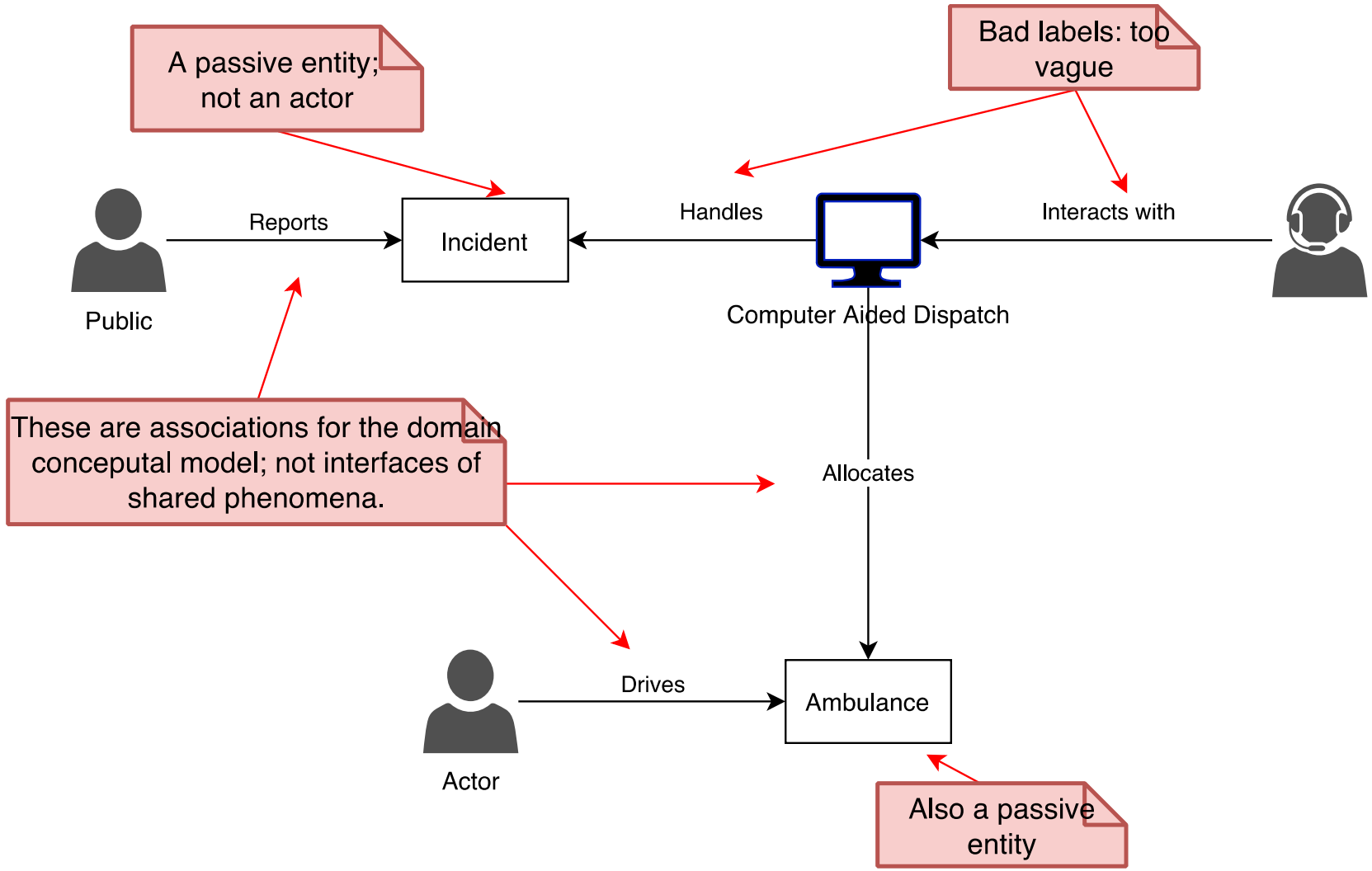
Mistake 2: Showing an internal component of the machine as if it was an external actor



Wrong because the Incident Database is an internal component of the CAD

Note: One of the purposes of the context diagram is to clarify the machine boundaries (its inputs and outputs). If the incident database was an external actor (under the responsibility of a different organization), that model would be correct.

Mistake 3: Overloading the context diagram with elements from the domain conceptual model



Notes and Further Readings

Traditional context diagrams

- model the machine interface only; not interactions between world actors.
- arrows denote dataflow rather than control (who initiates the interaction).

Modern context diagrams

- used in Problem Frames method, KAOS method, and informally.

Exercises

Flood Warning System

Sketch a context diagram for an automated flood warning system (AFWS).

The system is to be deployed in a region of UK recently affected by flooding.

The system's purpose is to warn the population and emergency services of risk of flooding at least two hours in advance.

The system takes input from

- a set of precipitation sensors that measure precipitation levels across various locations, and
- a set of river stream sensors that measure river height and velocity at several locations along the two main rivers that traverse the region.

The AFWS uses a flood prediction model developed by hydrologist. The model can predict more than 2 hours in advance what areas (e.g. village) will be flooded provided it has accurate readings from at least 90% of the precipitation and river stream sensors.

The system will send flood alerts to the emergency services of affected areas through the telephone network.

The system will also override Cable TV networks to transmit alerts to the population.

People can also register to receive flood alerts through text messages.