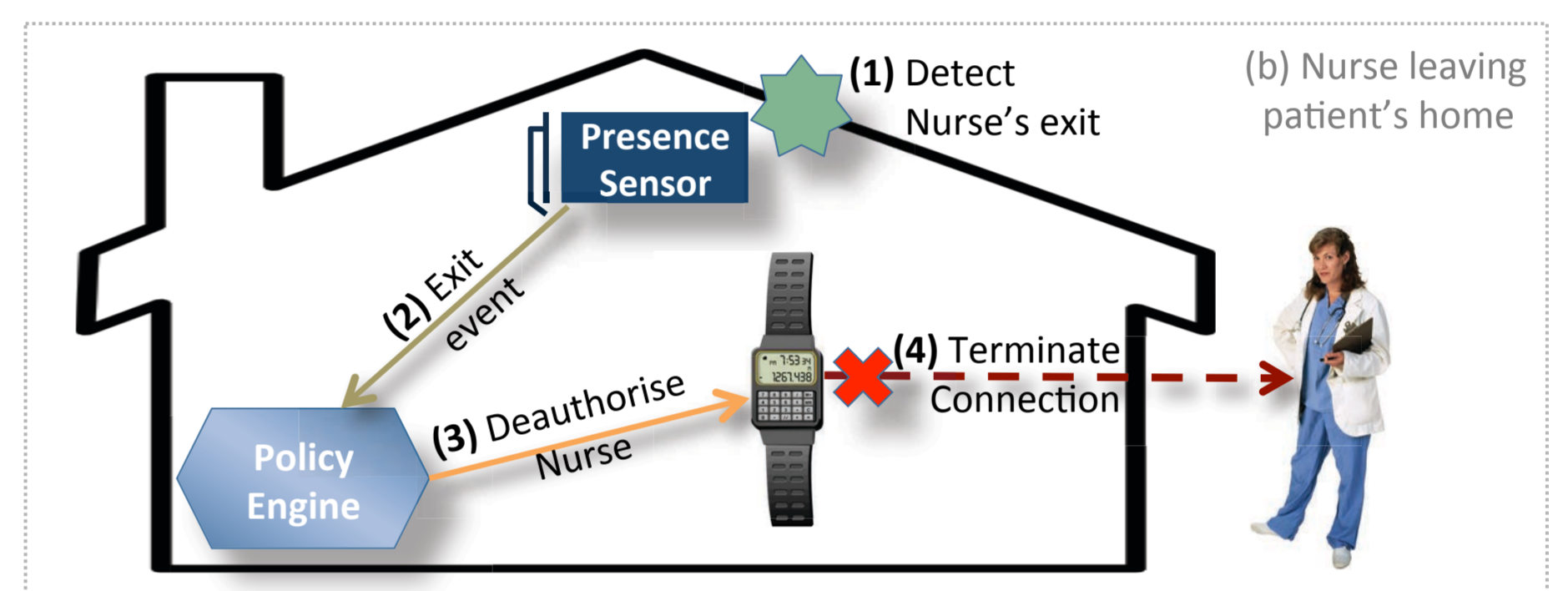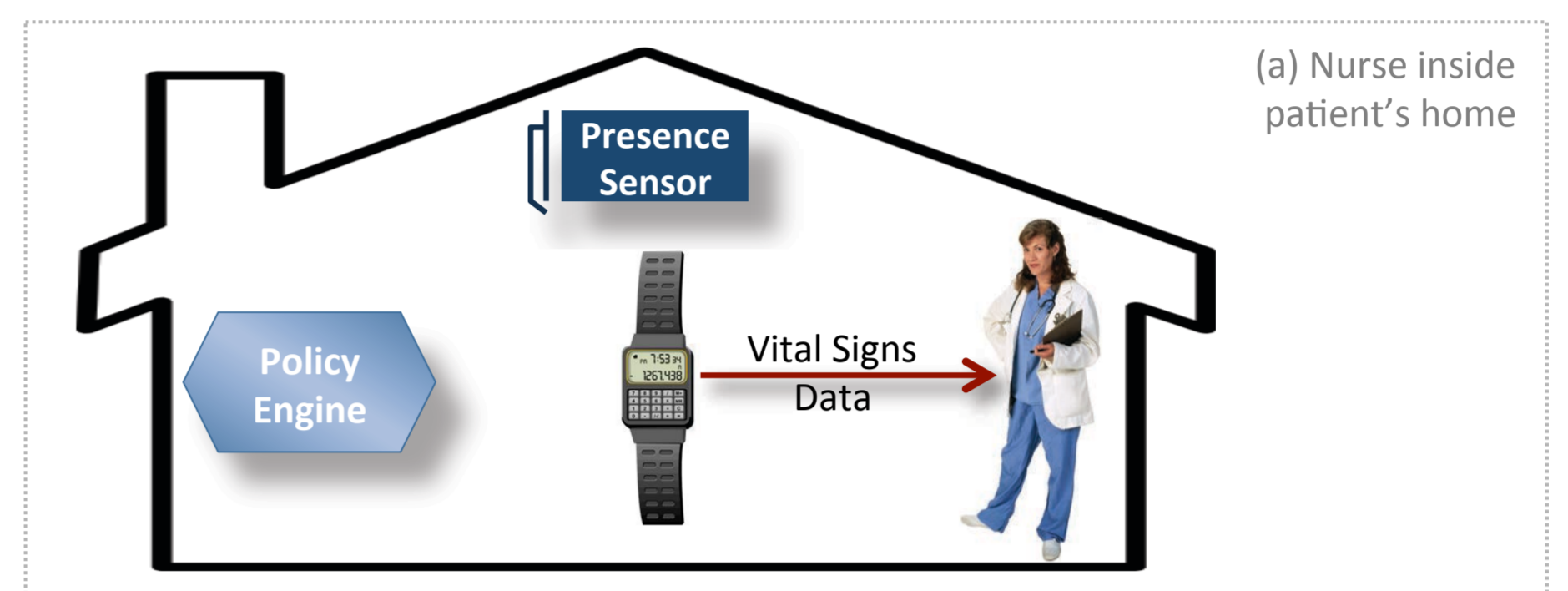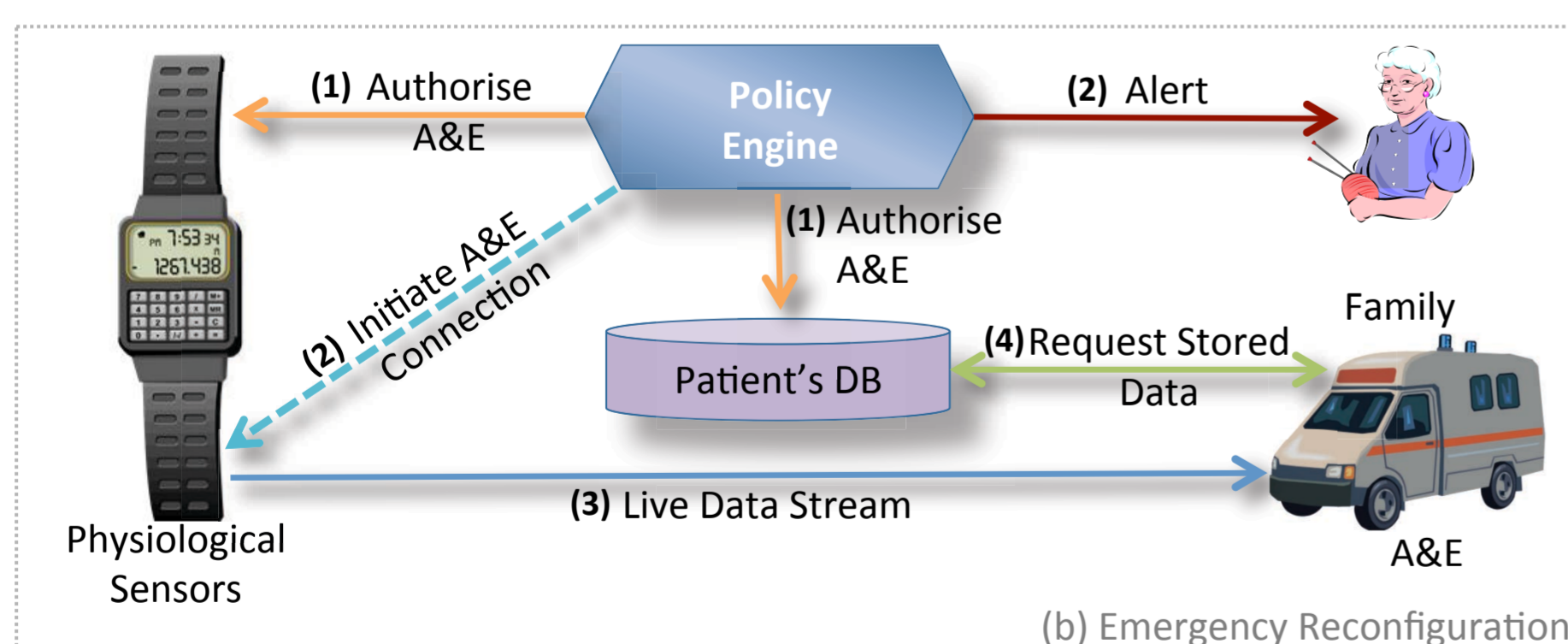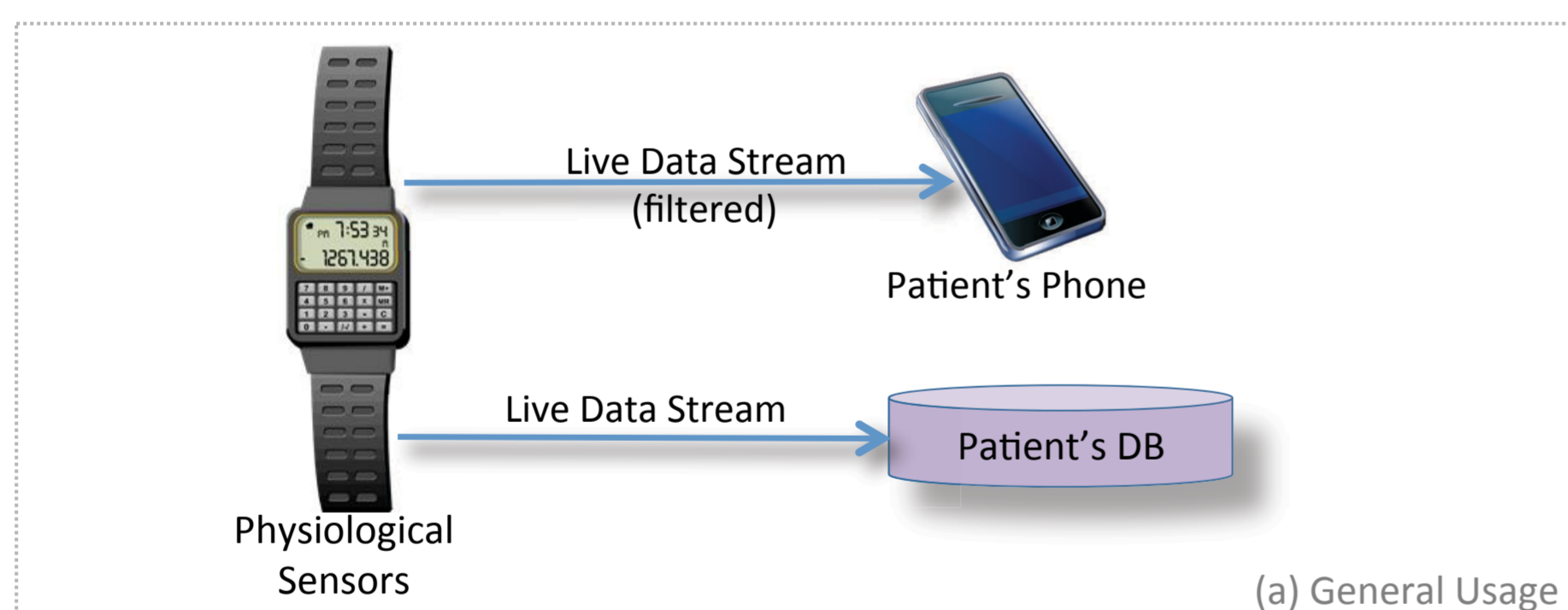# Reconfigurable Middleware for Future Care Environments

Current healthcare systems are often closed and/or only (inter)operate in specific environments or application contexts.

Future care services will involve using sensing, monitoring, mobile and other system components to improve diagnosis, feedback and response. Components can be useful in meeting a range of goals, often in ways not contemplated by their designers.

The more technology we can leverage, the better the quality of care

(a) Nurse inside patient's home

Presence Sensor

Policy Engine

Vital Signs Data

(b) Nurse leaving patient's home

(1) Detect Nurse's exit

Presence Sensor

(2) Exit event

Policy Engine

(3) Deauthorise Nurse

(4) Terminate Connection

Only carers that are physically present are authorised to access vital signs data
Middleware effects this policy, independent of the sensor or Nurse's applications

Live Data Stream (filtered)

Patient's Phone

Live Data Stream

Patient's DB

Physiological Sensors

(a) General Usage

(1) Authorise A&E

Policy Engine

(2) Alert

(2) Initiate A&E Connection

(1) Authorise A&E

Patient's DB

(4) Request Stored Data

Family

(3) Live Data Stream

A&E

Physiological Sensors

(b) Emergency Reconfiguration

In an emergency, the middleware automatically reconfigures the system to alert family members, and enable the accident & emergency services to respond

Note that (1),(2) and (3) represents an automatic policy-based response, whereas (4) is an A&E initiated operation, made possible by the privilege changes of (1)

Infrastructure supporting such an environment must facilitate *coordination*: *where the circumstances (events) determine the interactions between components.*

We have developed a policy engine, which works with a messaging middleware (*SBUS*) to dynamically reconfigure the system in order to meet an individual's personal care-related functional goals.

Our approach allows system components to focus on their core tasks without concern as to the context, environments and constraints in which they operate. This lowers the barrier for entry, and enables components to be used/reused in various ways to meet high-level care requirements.

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