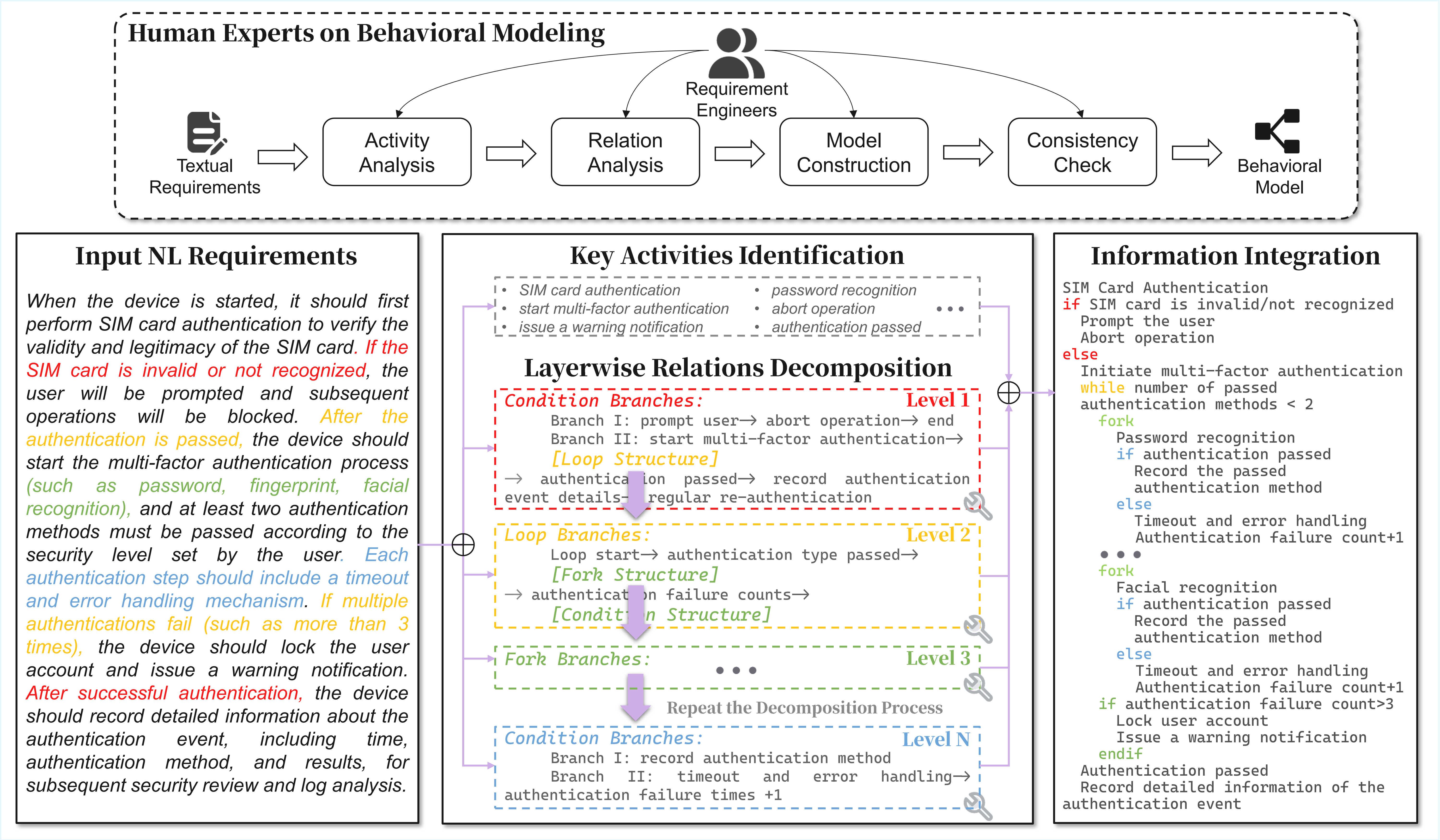

Input NL Requirements

When the device is started, it should first perform SIM card authentication to verify the validity and legitimacy of the SIM card. If the SIM card is invalid or not recognized, the user will be prompted and subsequent operations will be blocked. After the authentication is passed, the device should start the multi-factor authentication process (such as password, fingerprint, facial recognition), and at least two authentication methods must be passed according to the security level set by the user. Each authentication step should include a timeout and error handling mechanism. If multiple authentications fail (such as more than 3 times), the device should lock the user account and issue a warning notification. After successful authentication, the device should record detailed information about the authentication event, including time, authentication method, and results, for subsequent security review and log analysis.

Key Activities Identification

- *SIM card authentication*
- *start multi-factor authentication*
- *issue a warning notification*
- *password recognition*
- *abort operation*
- *authentication passed*

• • •

Layerwise Relations Decomposition

```
Condition Branches:                                          Level 1
      Branch I: prompt user→ abort operation→ end
      Branch II: start multi-factor authentication→
      [Loop Structure]
→ authentication passed→ record authentication
event details→ regular re-authentication
```

```
Loop Branches:                                               Level 2
      Loop start→ authentication type passed→
      [Fork Structure]
→ authentication failure counts→
      [Condition Structure]
```

```
Fork Branches:                • • •                          Level 3
```

Repeat the Decomposition Process

```
Condition Branches:                                          Level N
      Branch I: record authentication method
      Branch II: timeout and error handling→
authentication failure times +1
```

Information Integration

```
SIM Card Authentication
if SIM card is invalid/not recognized
  Prompt the user
  Abort operation
else
  Initiate multi-factor authentication
  while number of passed
  authentication methods < 2
    fork
      Password recognition
      if authentication passed
        Record the passed
        authentication method
      else
        Timeout and error handling
        Authentication failure count+1
    • • •
    fork
      Facial recognition
      if authentication passed
        Record the passed
        authentication method
      else
        Timeout and error handling
        Authentication failure count+1
    if authentication failure count>3
      Lock user account
      Issue a warning notification
    endif
  Authentication passed
  Record detailed information of the
authentication event
```