

# Orchestrating Networked Entities

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*The Phoenix Research Group*

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INSTITUT NATIONAL  
DE RECHERCHE  
EN INFORMATIQUE  
ET EN AUTOMATIQUE



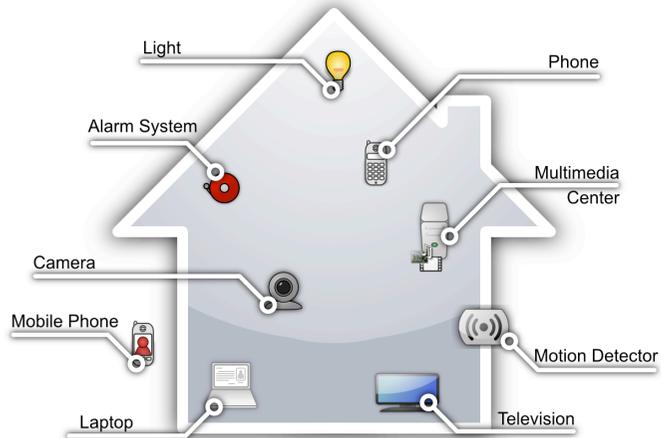
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# Phoenix research group

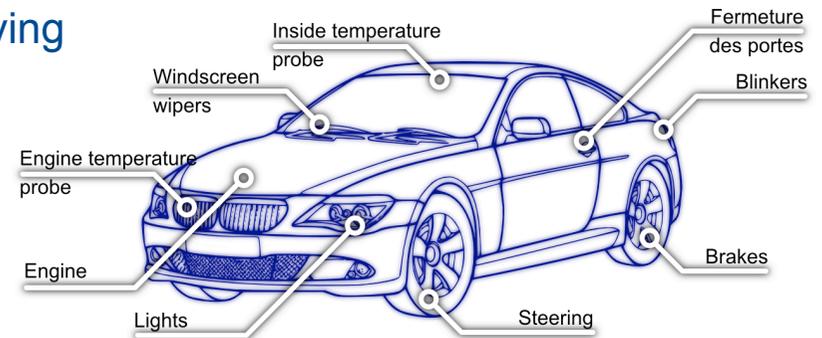
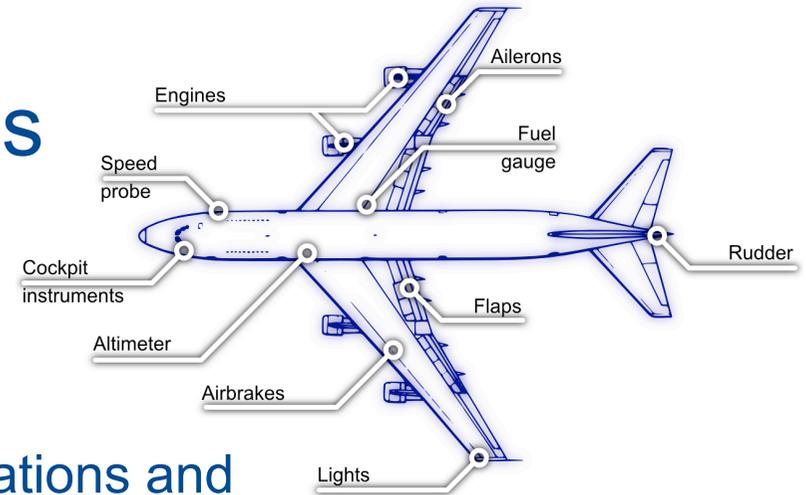
- 2 researchers
- 2 research engineers,
- 6 PhD students



# Phoenix research group Network-Centric Platforms



- Avionics
- Telecommunications and networking
- Pervasive computing:
  - Home/building automation
  - Assisted living



Tool-based approach to developing applications that orchestrate resources within a platform

# Phoenix research group

Research theme:

A language-based approach to software development

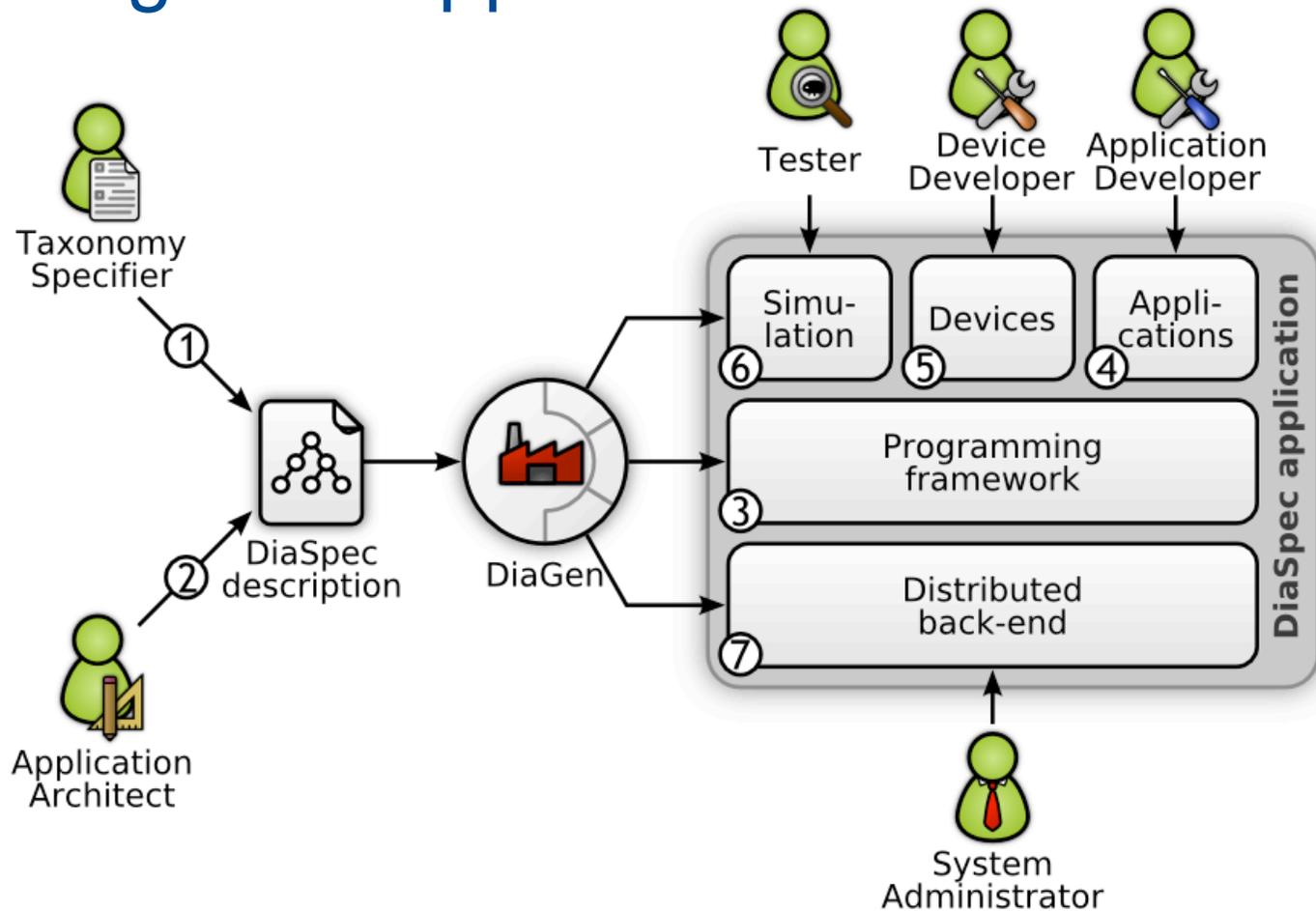
We develop:

- Language constructs to describe software systems
- Compilation techniques to support and guide programming
- Verification techniques to ensure :
  - Functional properties (e.g., implementation conformance)
  - Non-functional properties (QoS and fault tolerance)

Web site: <http://phoenix.inria.fr>

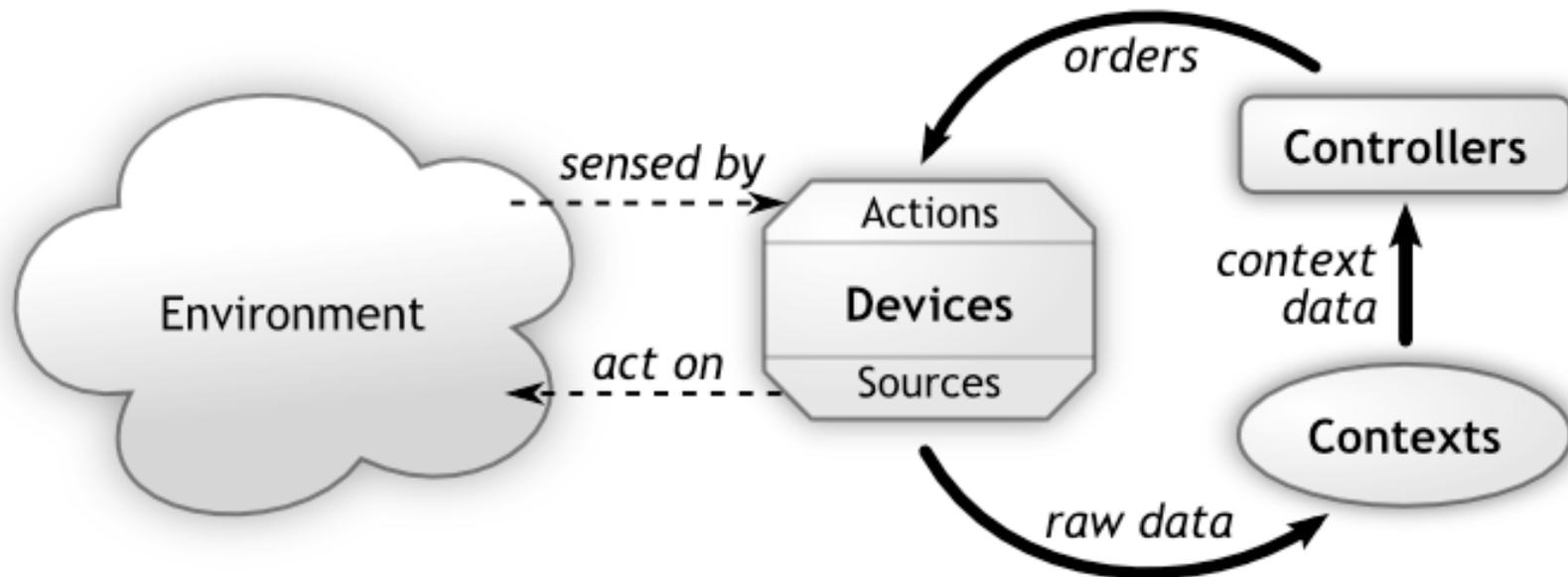


# Our Integrated Approach

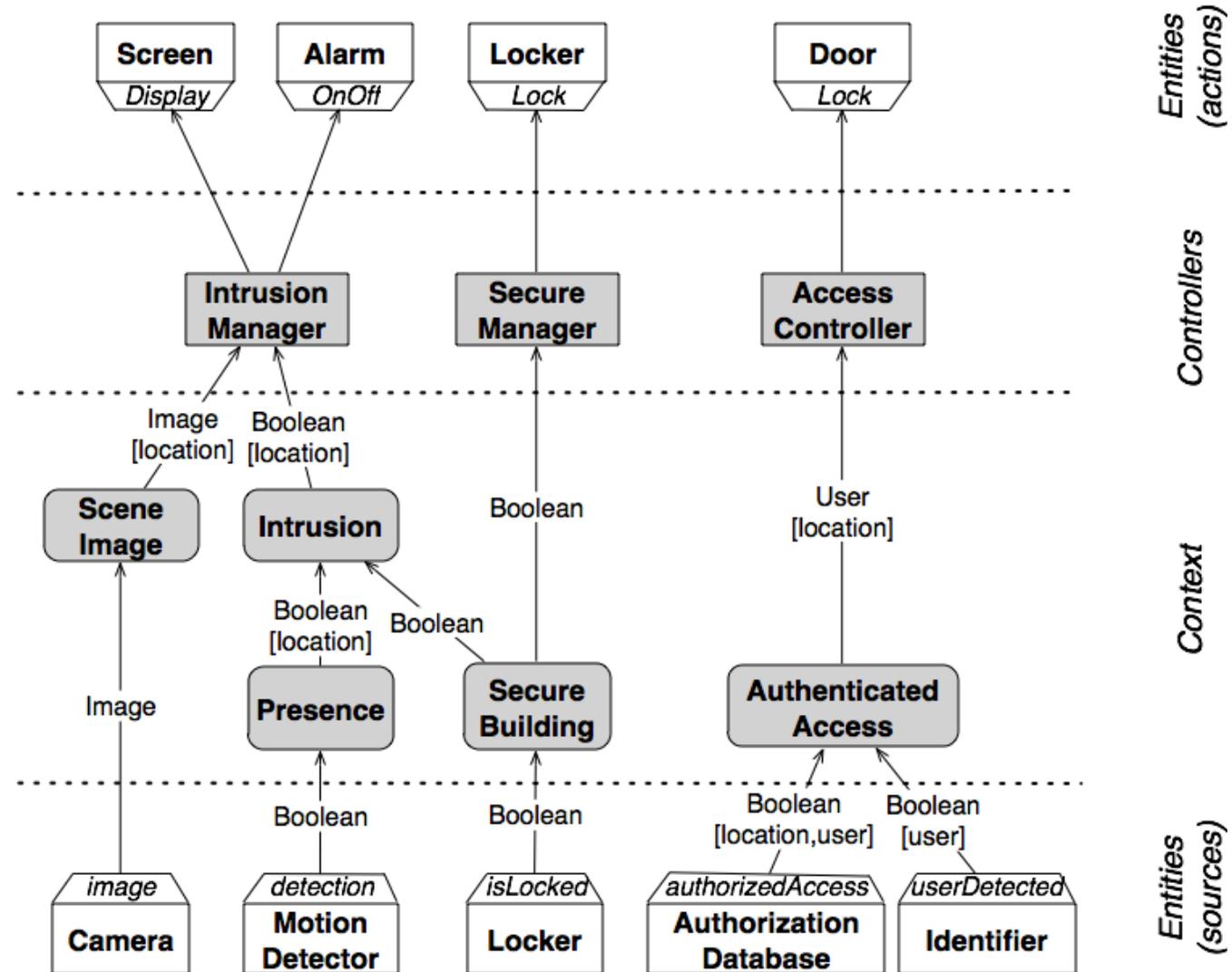
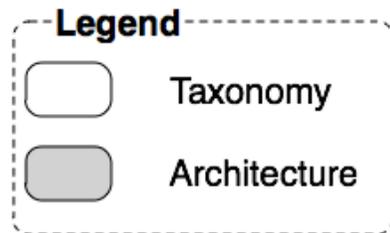


supports the programmer all along the development cycle

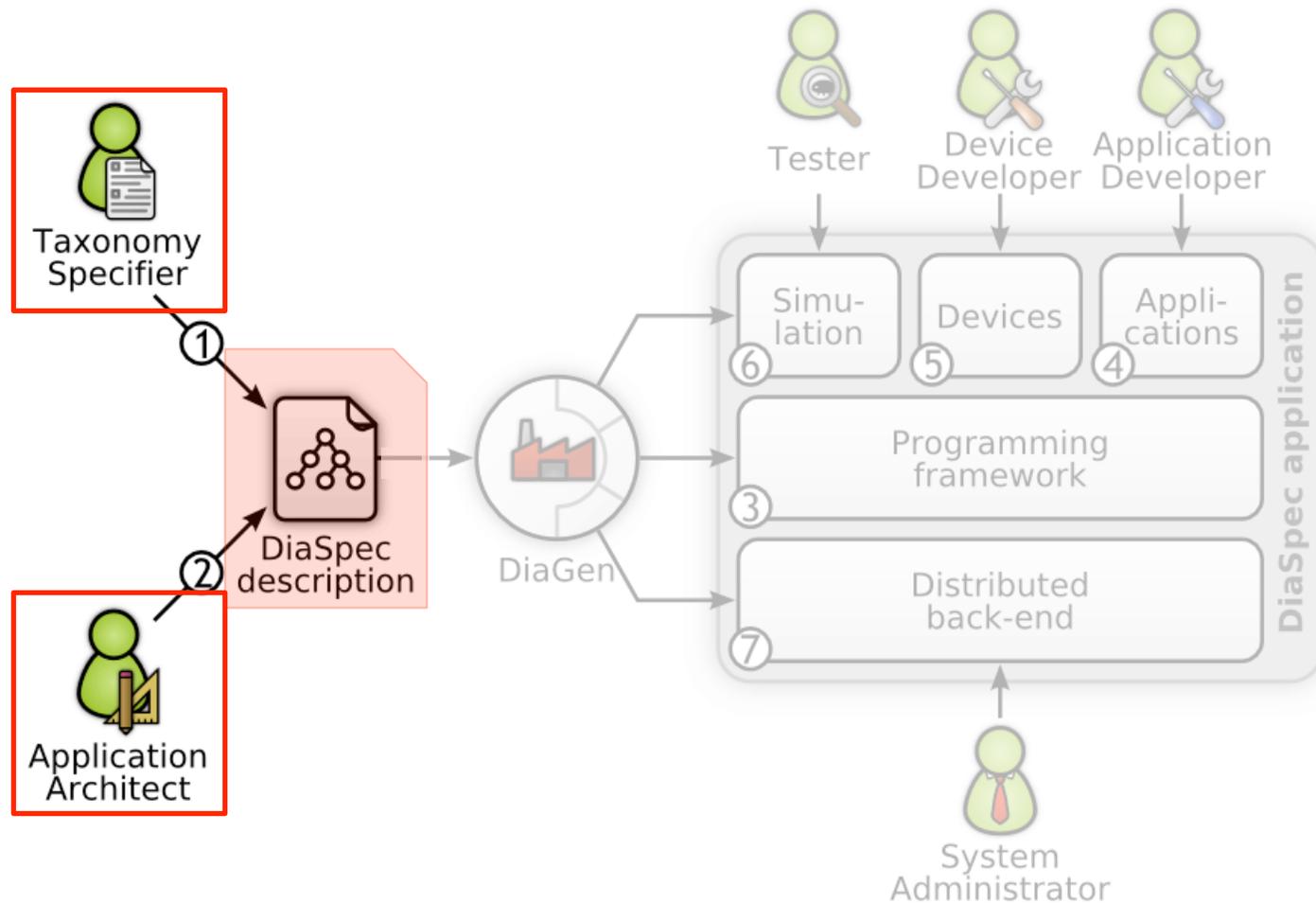
# The Sense/Compute/Control (SCC) Paradigm



# Example: Intrusion/Access Management



# Specification-Driven Approach



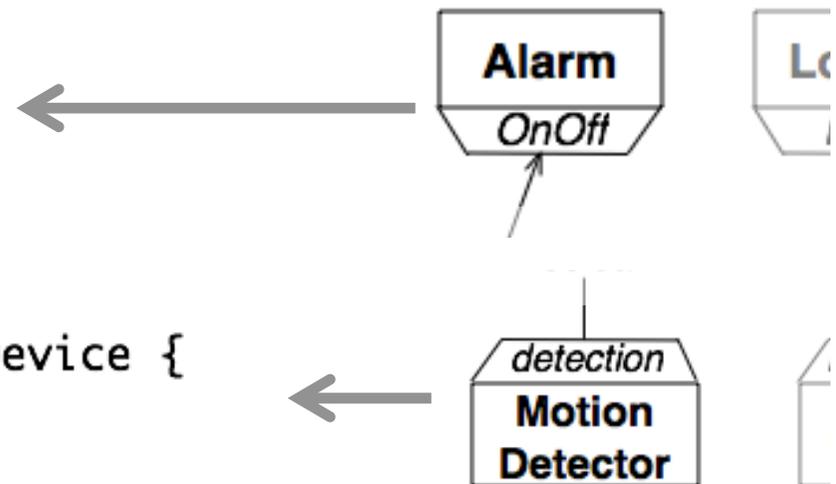
# Taxonomy Specification

```
structure Location {
  name as String;
}
```

```
device LocatedDevice {
  attribute location as Location;
}
```

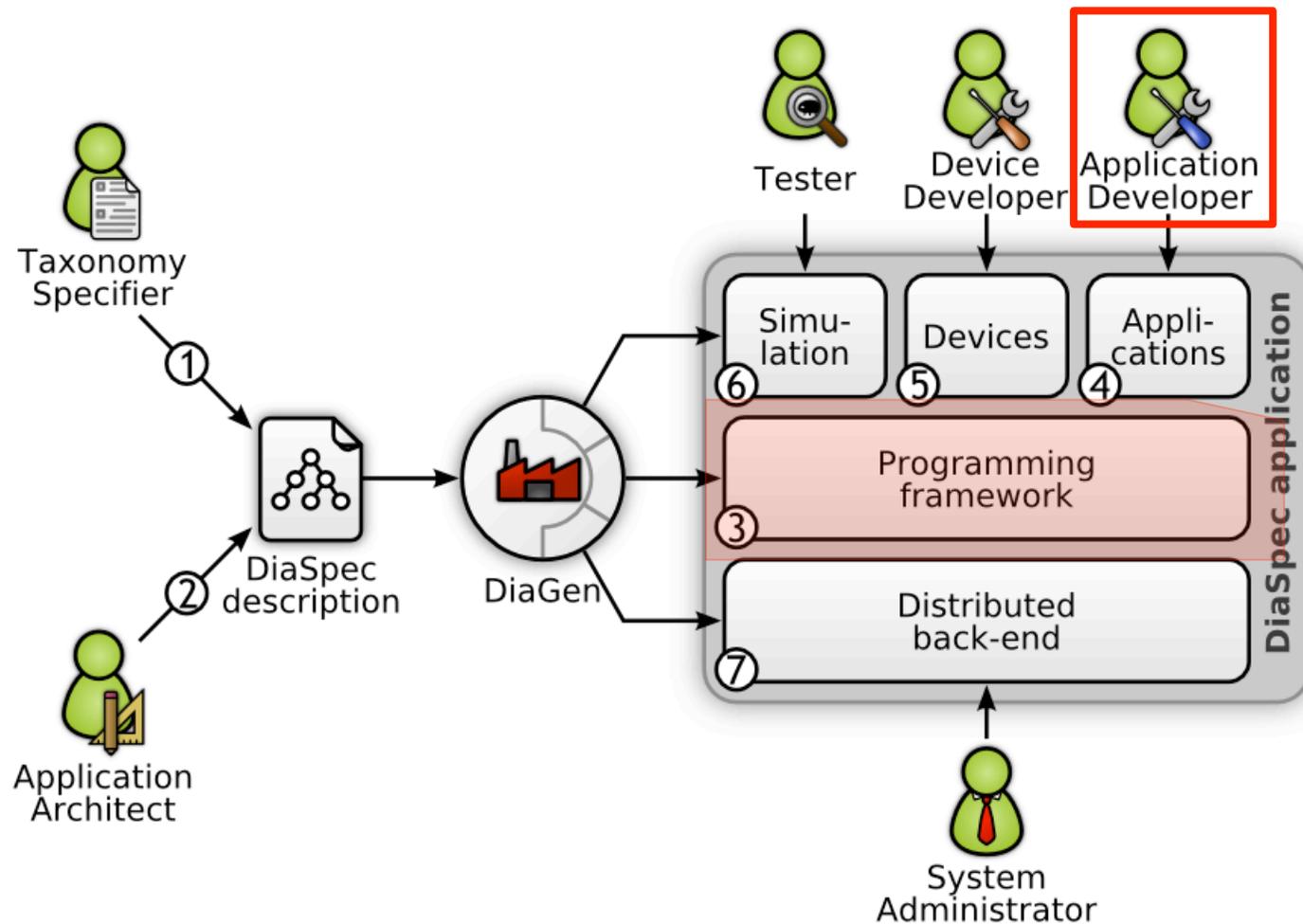
```
device Alarm extends LocatedDevice {
  action OnOff { on(); off(); }
}
```

```
device MotionDetector extends LocatedDevice {
  source detection as Boolean;
}
```





# Specification-Driven Approach

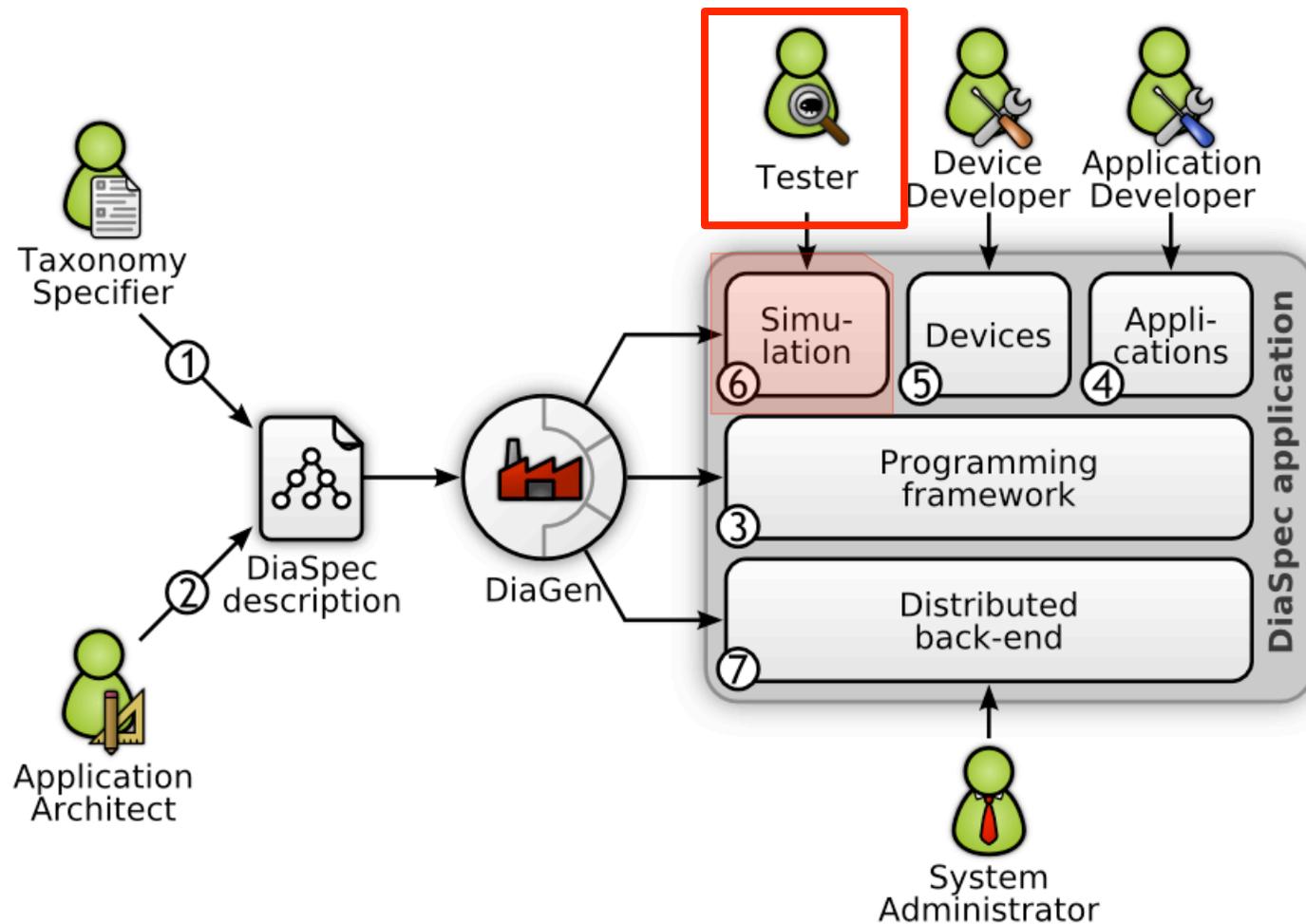


# Implementation using The Dedicated Programming Support

```
public class IntrusionManagerImpl extends IntrusionManager {
    ...
    @Override
    public void onNewIntrusion(Boolean intrusion,
                               Location location) {
        if (intrusion) {
            allAlarms().on();
            allSurveillanceScreens().alert(true);
            Image sceneImage = getSceneImage(location);
            if (sceneImage != null) {
                allSurveillanceScreens().
                    displayImage(sceneImage, location);
            }
        } else {
            allAlarms().off();
            allSurveillanceScreens().alert(false);
        }
    }
}
```



# Specification-Driven Approach



# Simulation Scenario Editor



# Simulation Scenario Execution

Simulating Alert Anti Intrusion - Siafu

Jul 27, 2010  
2:14 PM

Agents Places Overlays

AddressBook/86760765

**Watchman** ■

Position: N 49 0.205 E 8  
Destination: none

Group: None  
Id: None  
Location: None  
Tvde: Human

Moves freely

**Thief** ■

Position: N 49 0.209 E 8 0.413  
Destination: none

Group: None  
Id: None  
Location: Office  
Tvde: Human

# Ongoing and future research directions

- Architecturing error handling
- Architecturing security
- Architecturing QoS
- Certifying architectures (incrementally)
- Monitoring software systems
- Comparing software development approaches
- Hybrid systems
- Home/building automation
- Assisted living / Patient monitoring
- Avionics / Drones
- Secure open platforms

