



Investigation of Organizational Models for the Creation of Ethical Machines

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Brasília/2024



Presentation Agenda

1. Toolkit for Multi-Agent Systems (MAS)
2. Toolkit and Ethics
3. Experimental Scenarios
4. Schedule Proposal



1. ToolKit for Developing Intelligent Systems Based on Beliefs-Desires-Intentions (BDI)

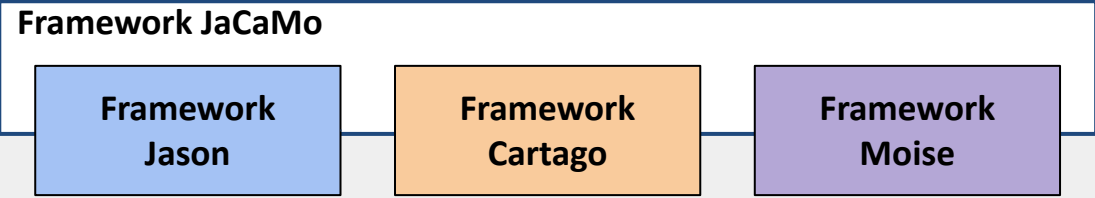
1 - MAS Development Framework

2 - Embedded MAS Development Framework

3 - Integrated Development Environment (IDE)



MAS
Development





1 - MAS Development Framework

Framework JaCaMo

Framework Jason

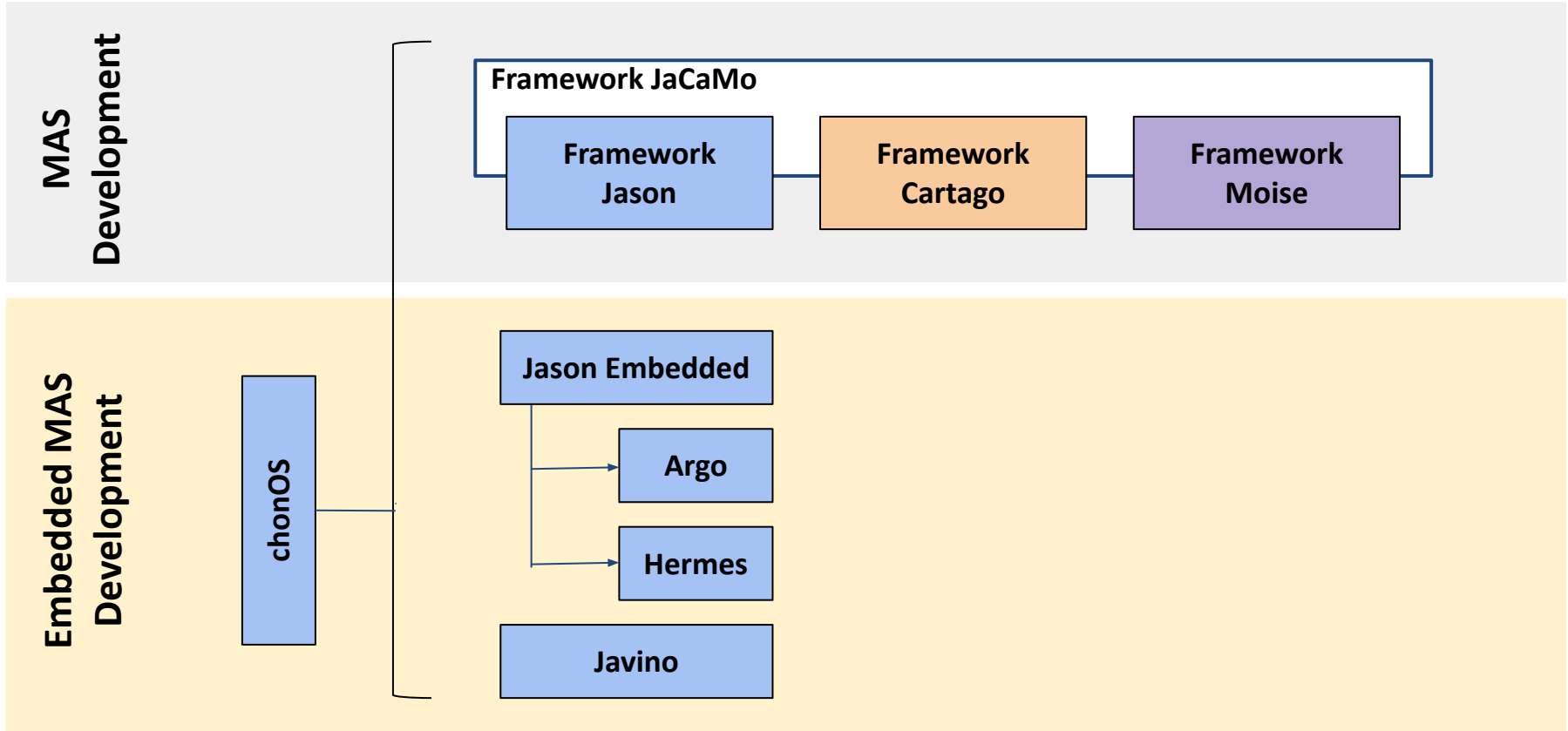
Framework Cartago

Framework Moise

Development of SMA Based on BDI

Creating real-world abstractions for intelligent agents

Specification of organizational norms and ethics for agents





2 - Embedded MAS Development

Jason Embedded

Argo

Jason extension that allows agents to act on hardware

Hermes

Jason extension that allows communication and movement of agents between MAS

Javino

Serial interface middleware between agents and controllers



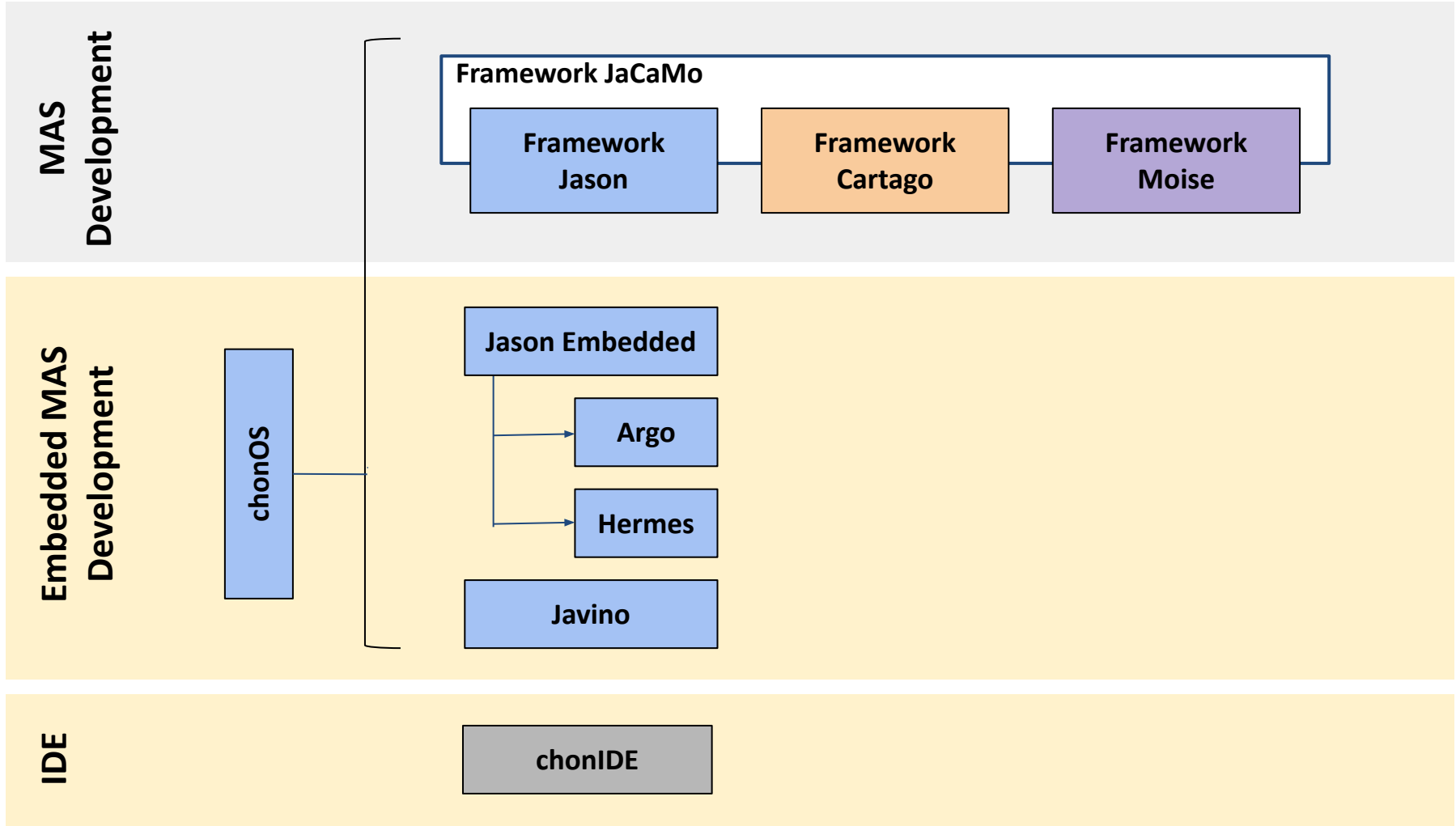
2 - Embedded MAS Development

chonOs

Framework JaCaMo

Jason Embedded

Operating System that provides an environment for running Jason Embedded, facilitating the configuration of Embedded MAS.



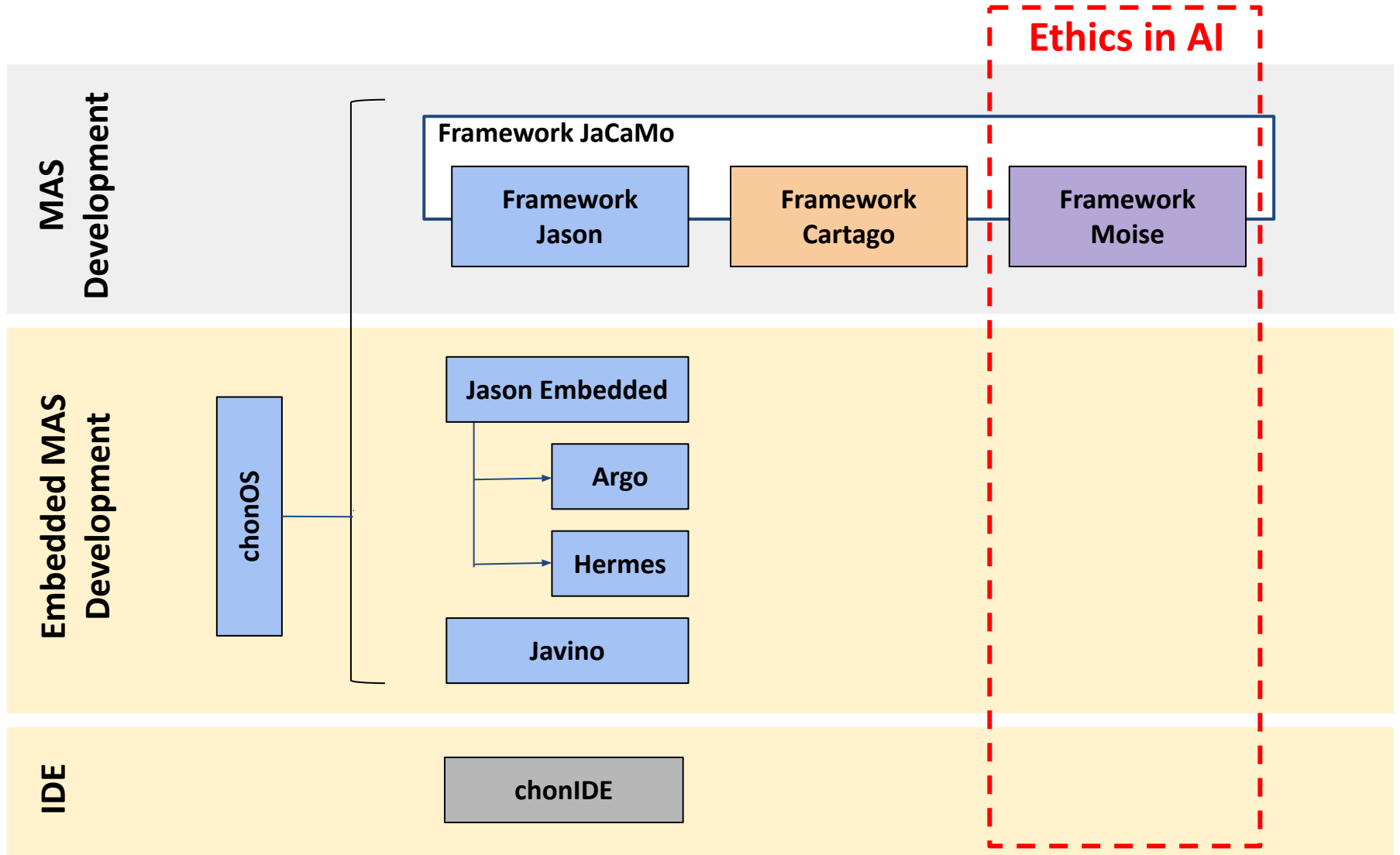


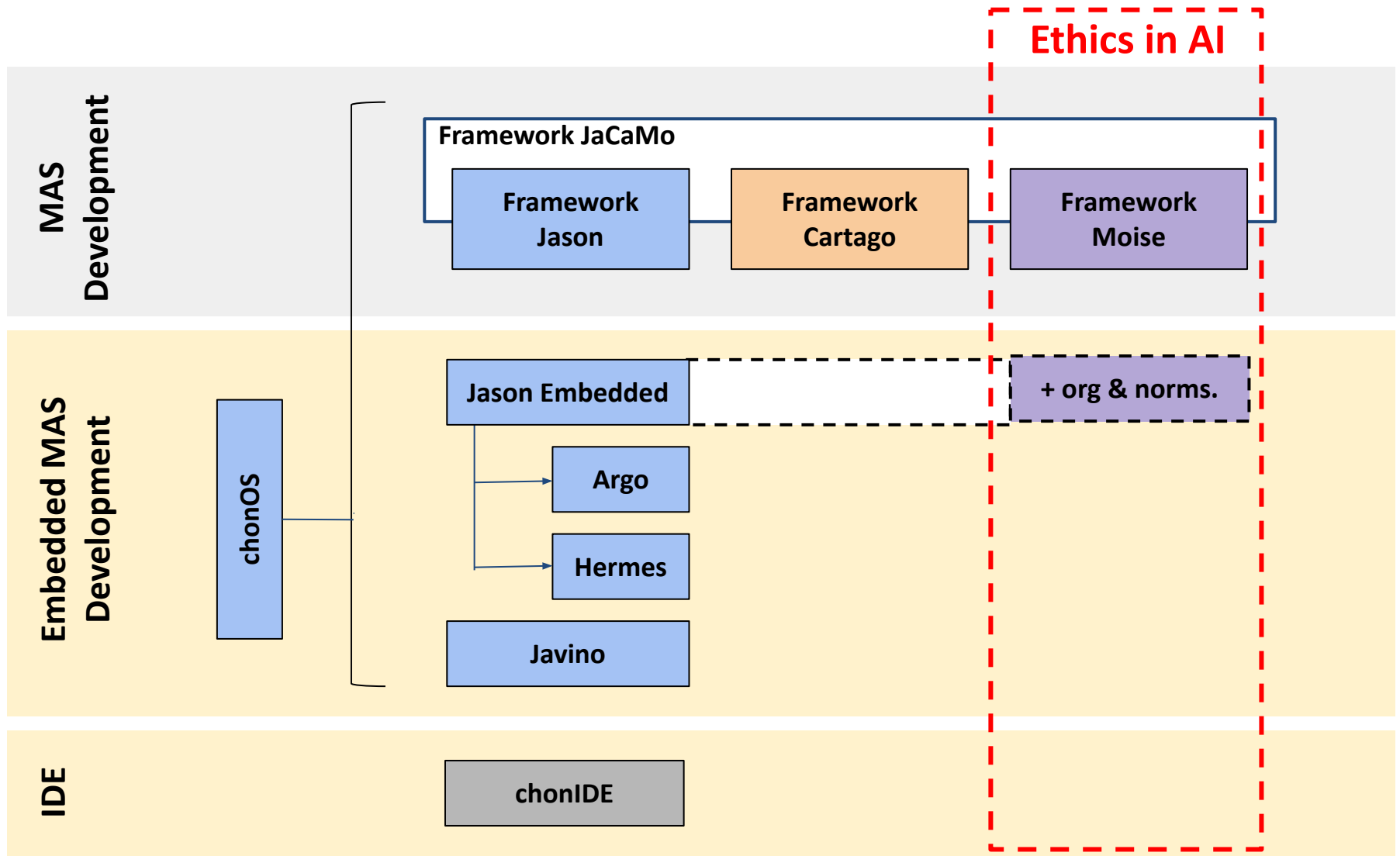
3 - Integrated Development Environment (IDE)

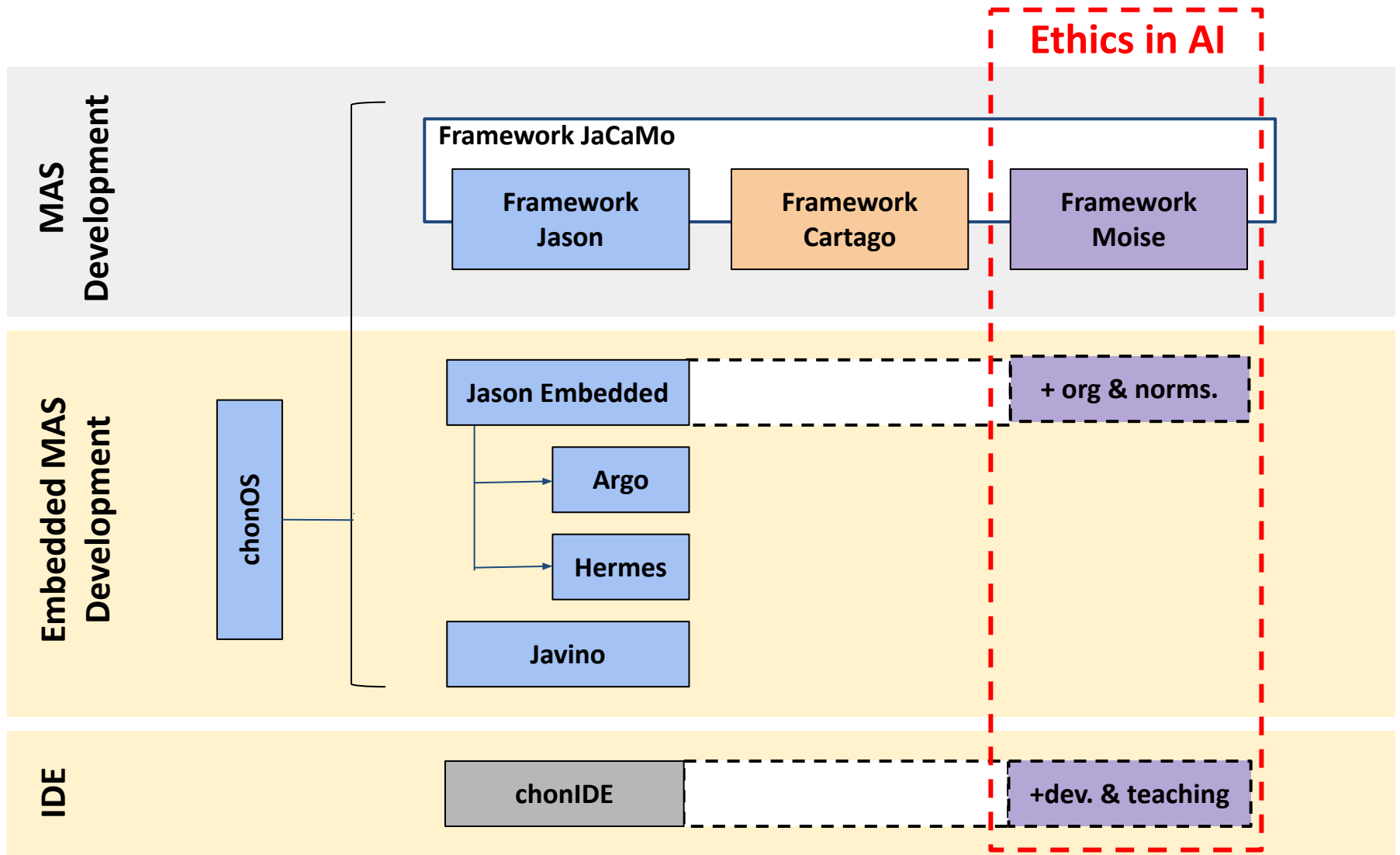
chonIDE

```
chonIDE  Mind Inspector  Logs  
blink  bane  Argo  
Multi-Agent System  
  Agents  
    bane  
  Firmware  
    blink  
  Libraries  
    Javino  
1  /* Initial beliefs and rules */  
2  serialPort(ttyUSB0).  
3  
4  /* Initial goals */  
5  !start.  
6  
7  /* Plans */  
8  +!start: serialPort(Port) <-  
9    .port(Port);  
10   .percepts(open);  
11  
12  +ledStatus(on) <- .act(ledOff).  
13  
14  +ledStatus(off) <- .act(ledOn).  
15  
16  +port(Port,Status):  
17  Status = off | Status = timeout <-  
18  .percepts(close).  
19
```

IDE for the development and teaching-learning of embedded or non-embedded MAS









2. ToolKit e Ethics: Opportunities

1 - MAS Development Framework

2 - Embedded MAS Development Framework

3 - Integrated Development Environment (IDE)

Ethics in MAS

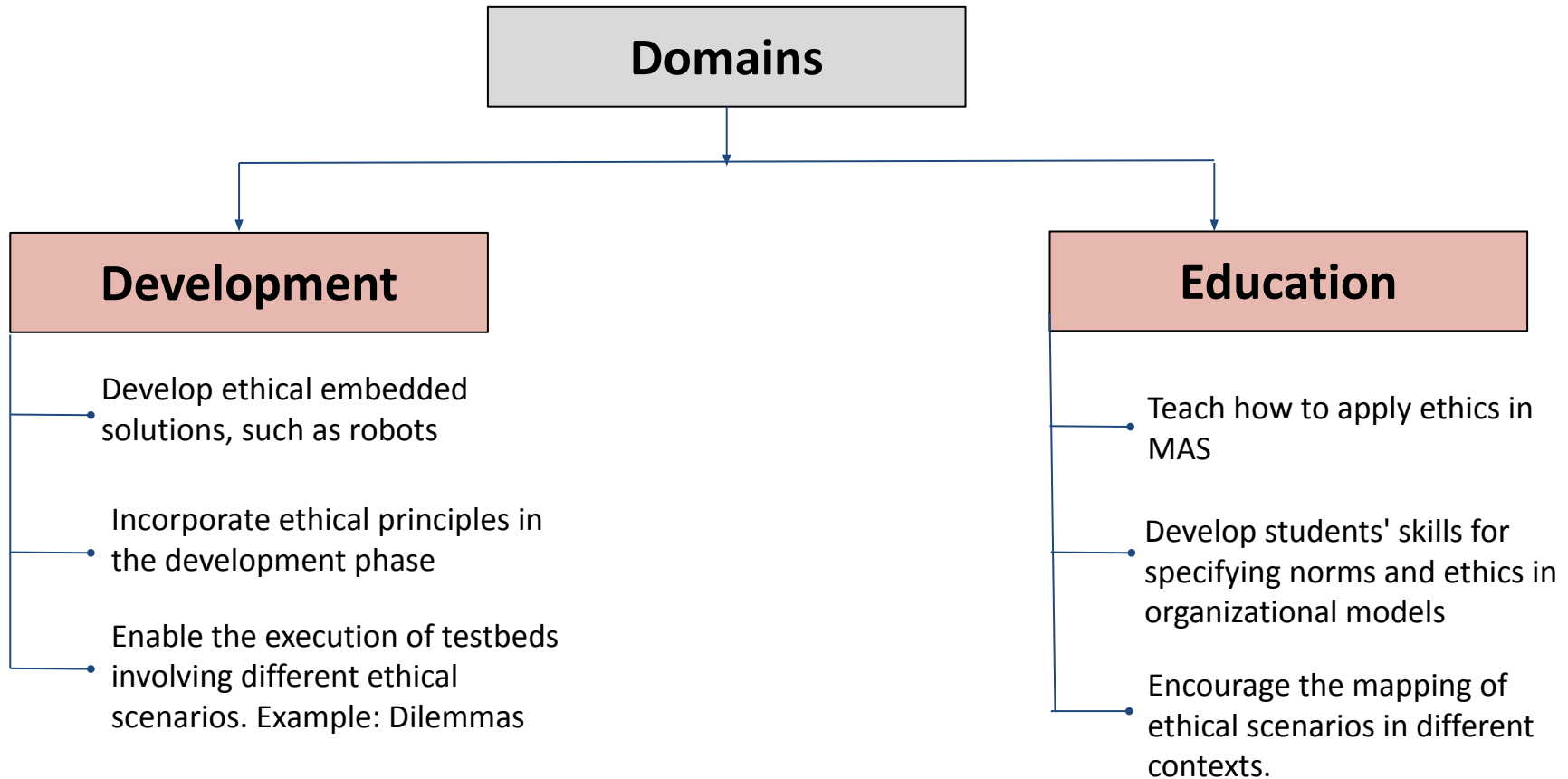
Some normative frameworks, such as Moise, restrict agents' behavior per established organizational norms. **Whether existing frameworks have sufficient concepts to apply norms and ethics in Embedded MAS is unknown.**

There are no organizational and normative restrictions on the behavior of agents.

The IDE does not allow the development and teaching learning of MAS with ethical concerns

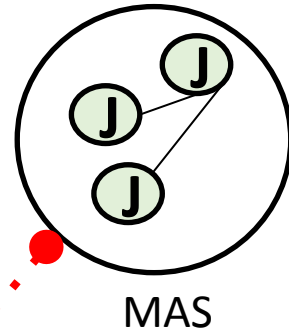
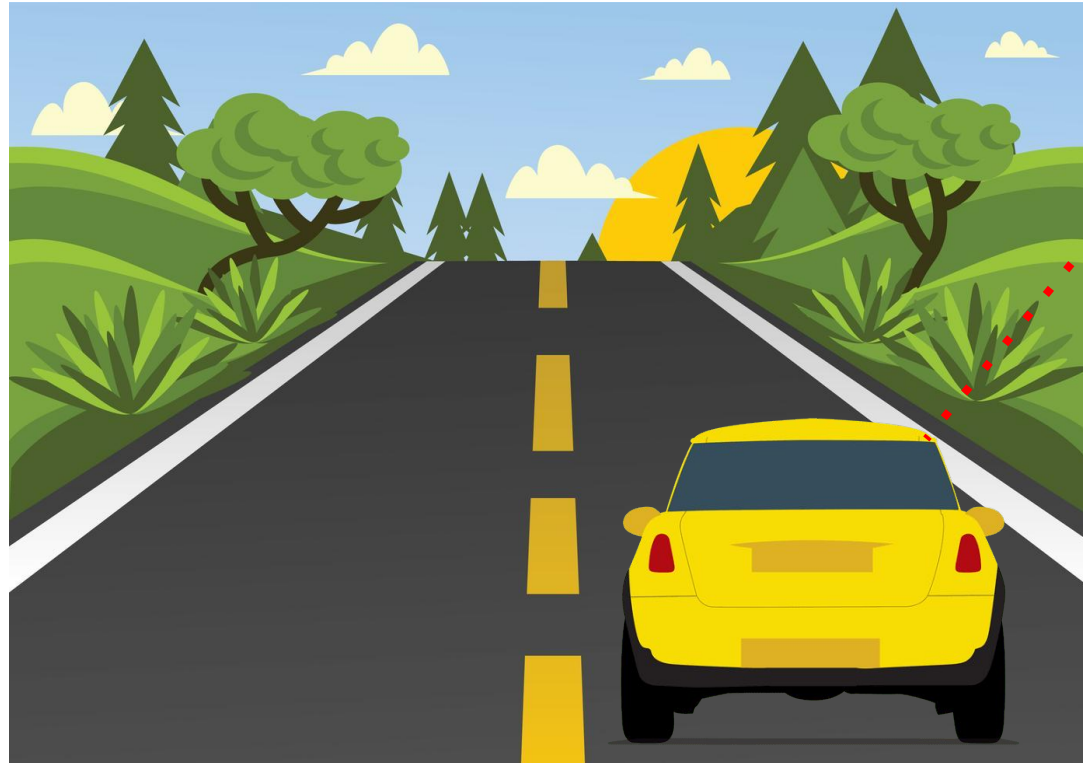


2. ToolKit e Ética: Goals



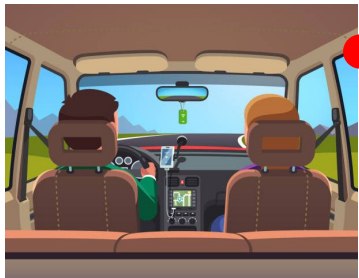


3. Experimental Scenario 1

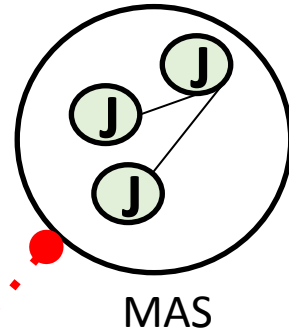




3. Experimental Scenario 1

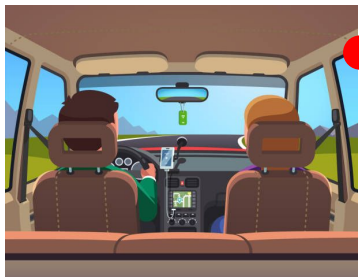
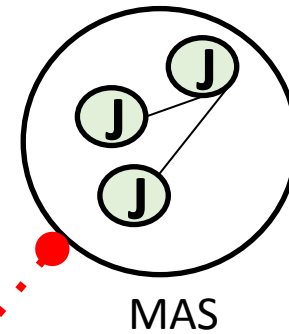


Somente passageiros adultos





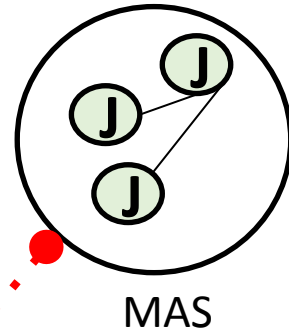
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Somente passageiros adultos

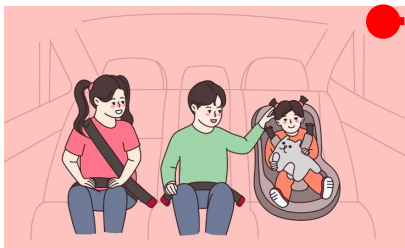


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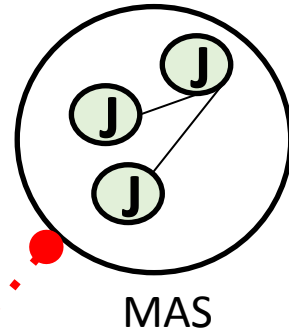
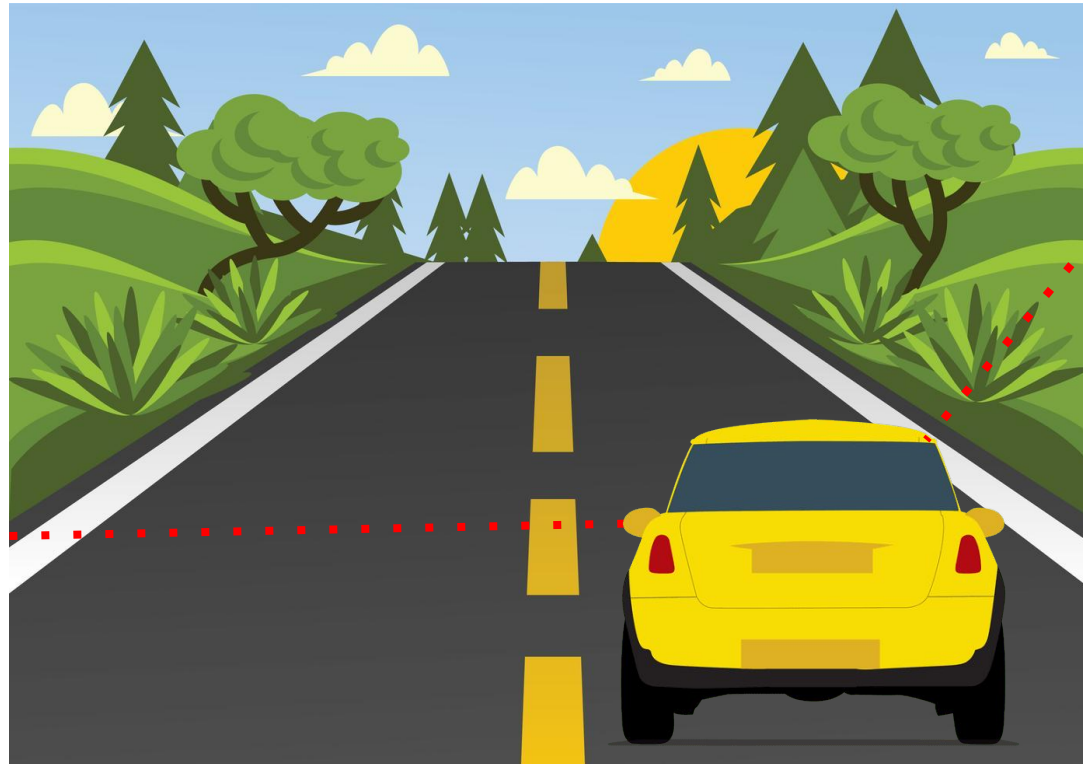




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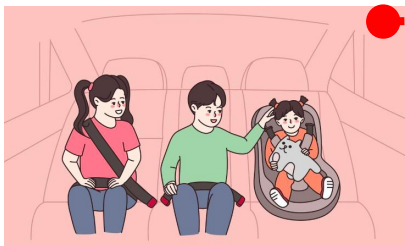
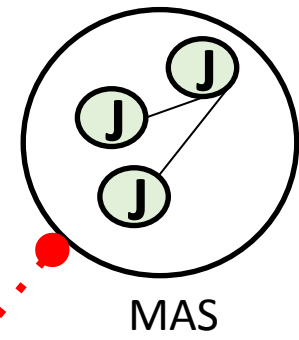


Passageiros adultos com um bebê





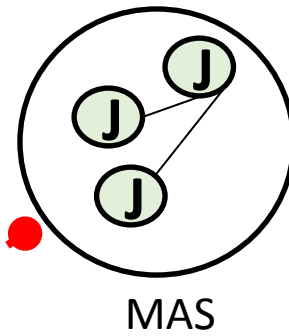
3. Experimental Scenario 1



Passageiros adultos com um bebê

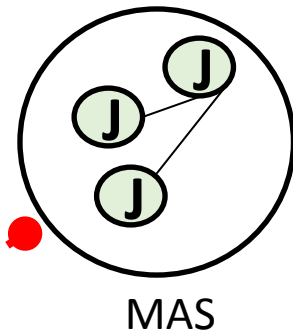


3. Experimental Scenario 2





3. Experimental Scenario 2





3. Experimental Scenario 2



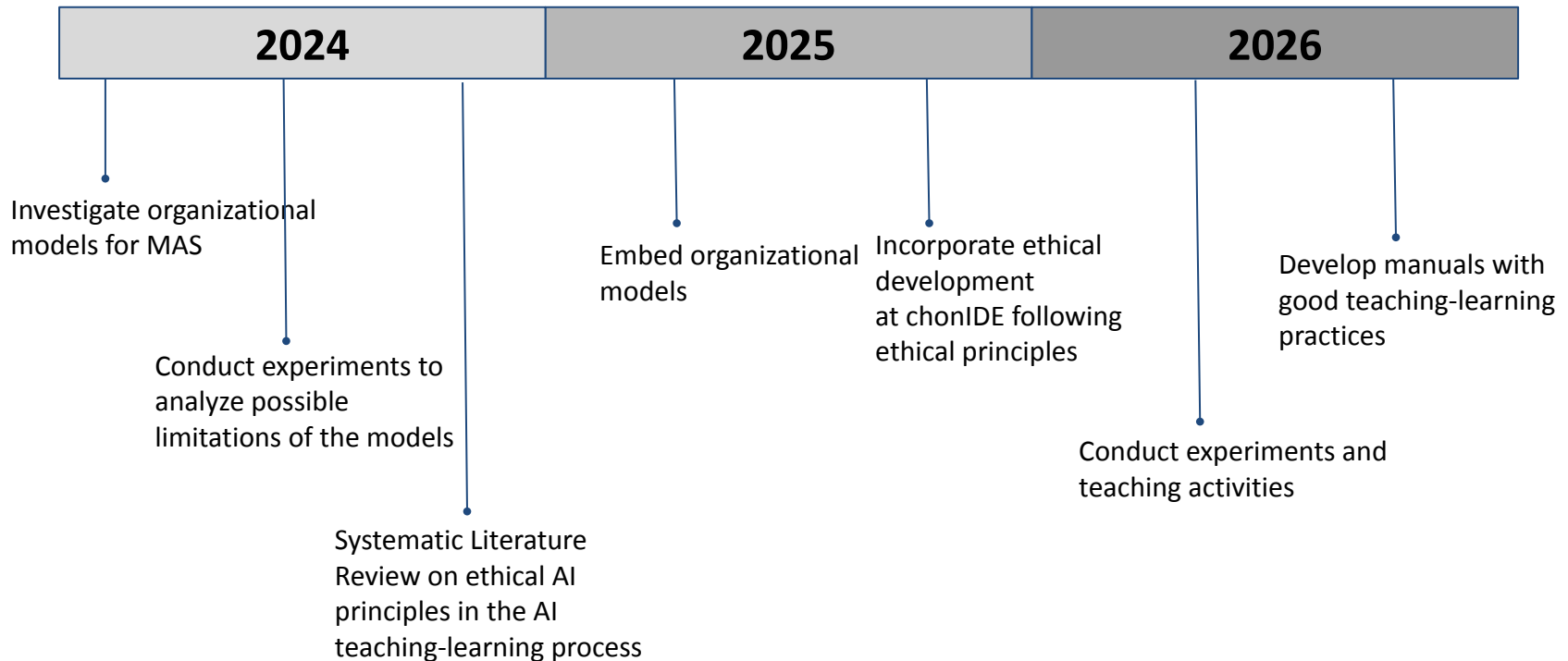


3. Experimental Scenario 2





3. Schedule Proposal





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