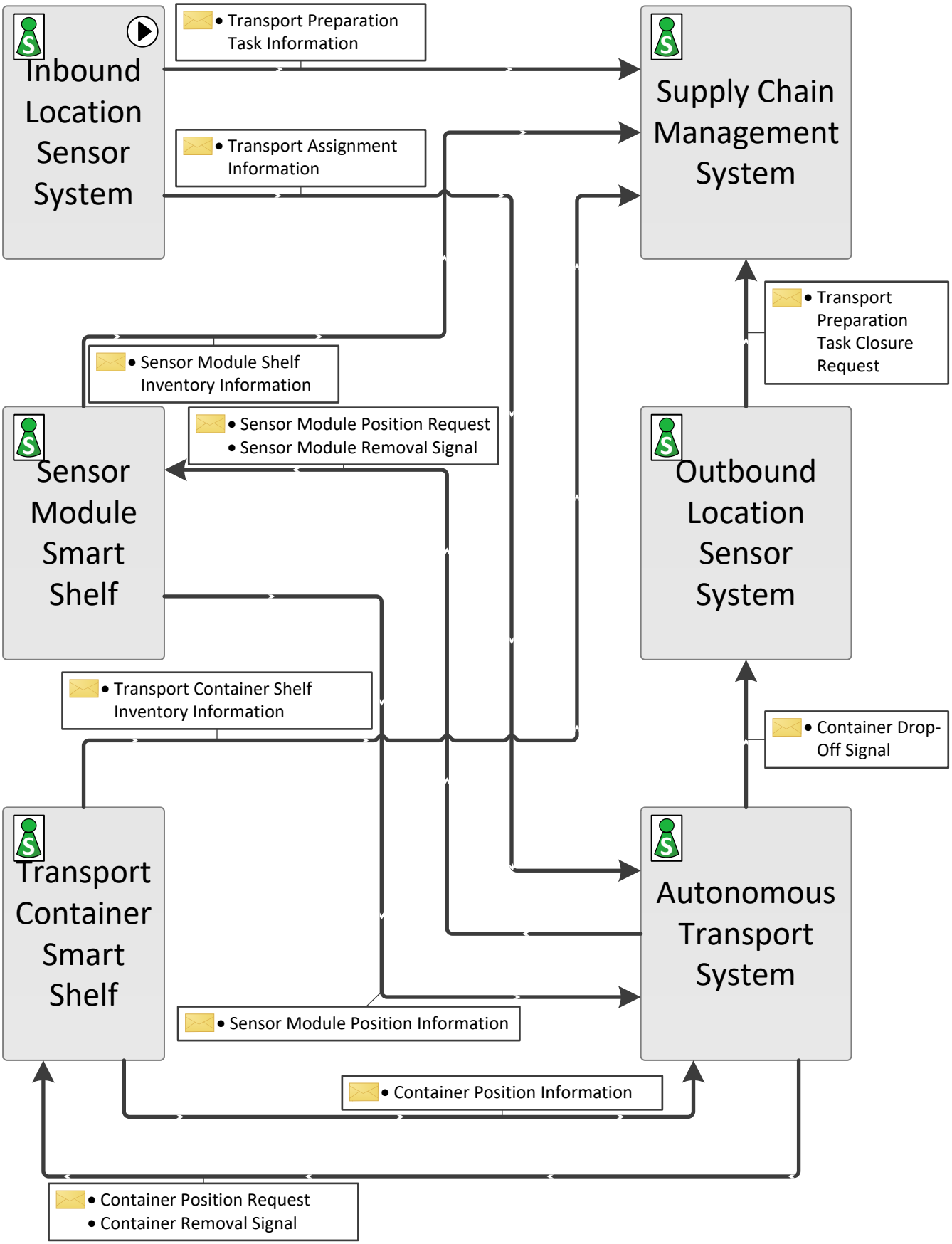
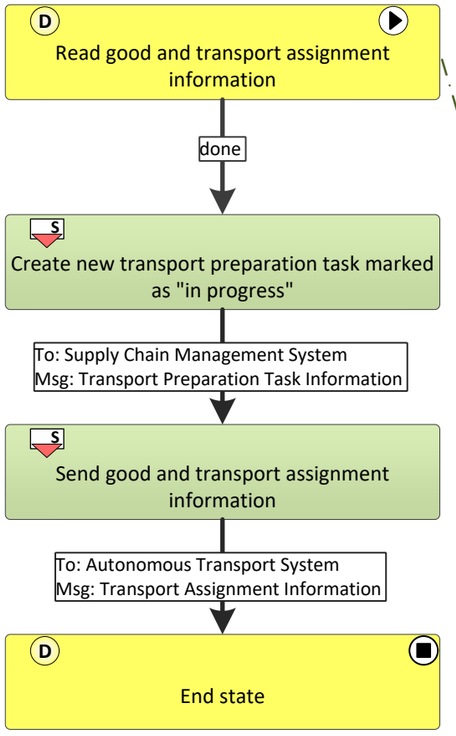

Inbound Location Sensor System
• Transport Preparation Task Information
Supply Chain Management System
• Transport Assignment Information
• Transport Preparation Task Closure Request
• Sensor Module Shelf Inventory Information
Sensor Module Smart Shelf
• Sensor Module Position Request
• Sensor Module Removal Signal
Outbound Location Sensor System
• Transport Container Shelf Inventory Information
• Container Drop-Off Signal
Transport Container Smart Shelf
Autonomous Transport System
• Sensor Module Position Information
• Container Position Information
• Container Position Request
• Container Removal Signal



Annotation 1

Discover Process Problem:

What if this action does not complete or does not complete on time?

Transparency (Observability)
How could the problem be detected by a HA/MA?
The Inbound Location Sensor System (ILSS) detects the problem based on a defined time out
Transparency (Predictability)
How well could the next intended action of the HA/MA be inferred?
...
Augmented Cognition (Directing Attention)
How could the HA/MA be made aware of the problem?
The ILSS informs the HA via an acustic signal
Augmented Cognition (Solution Exploration)
How could the HA/MA be supported in finding candidate solutions for solving the problem?
The ILSS sends a notification message to the HA suggesting to reposition the item
Augmented Cognition (Adaptability)
How could the HA/MA select the best solutions and solve the problem?
...
Coordination (Directability)
How well could the HA direct the resources of the MA?
...
Coordination (Calibrated Trust)
How could the level between the HA and the MA be improved?
...
Coordination (Common Ground)
How could the sharing of knowledge (beliefs, assumptions?) between the HA and the MA be improved?
- The HA uses color markers as a guideline to reposition the item
- The HA refers to the user manual of the ILSS

Requirement 1

Requirement Type: MA Requirement
Requirement Description: The ILSS should provide a notification feature to inform a HA about issues concerning the automated reading of good and transport assignment information
Requirement Priority: Medium

Possible Adaptations

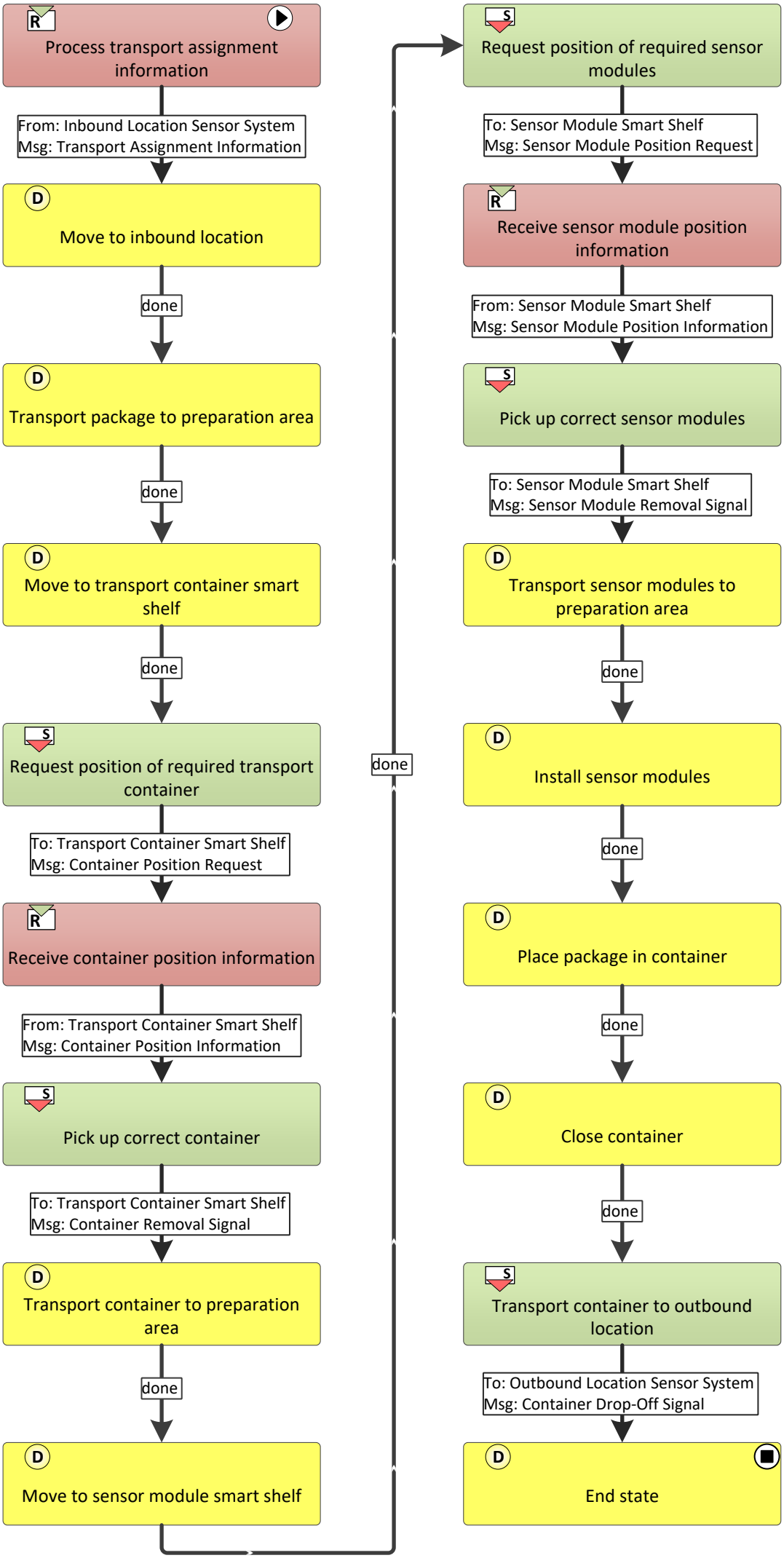
Adaptation Description: The ILSS behavior is adapted to trigger an acustic signal after a timeout. A process supervisor is introduced, who receives this signal and then resolves the issue.
Adaptation Description: The ILSS behavior is adapted to send a notification message after a timeout. A process supervisor is introduced, who receives the notification message on his smartphone and then resolves the issue.

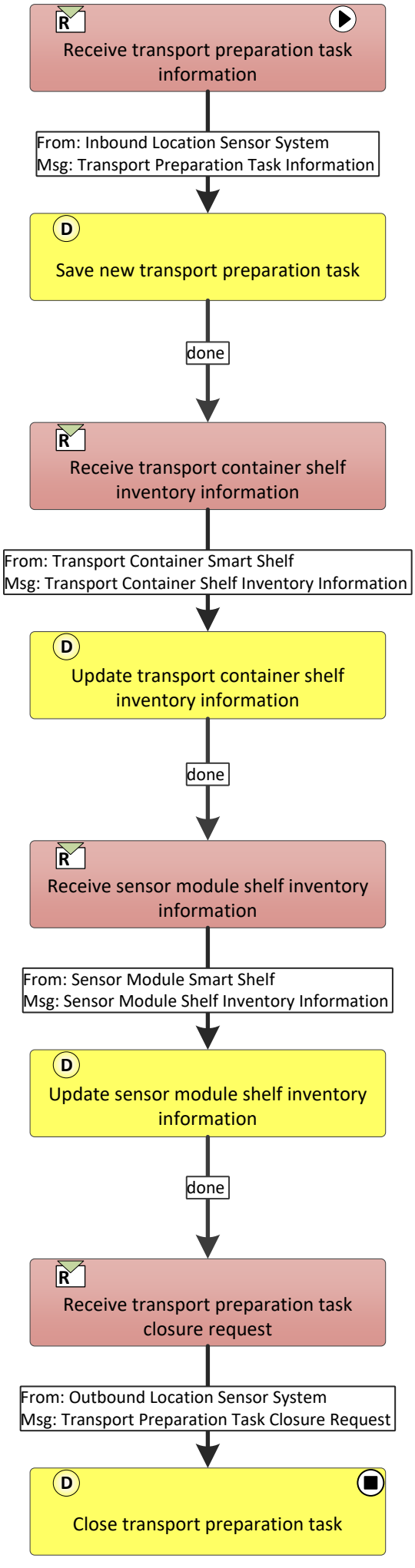
Requirement 2

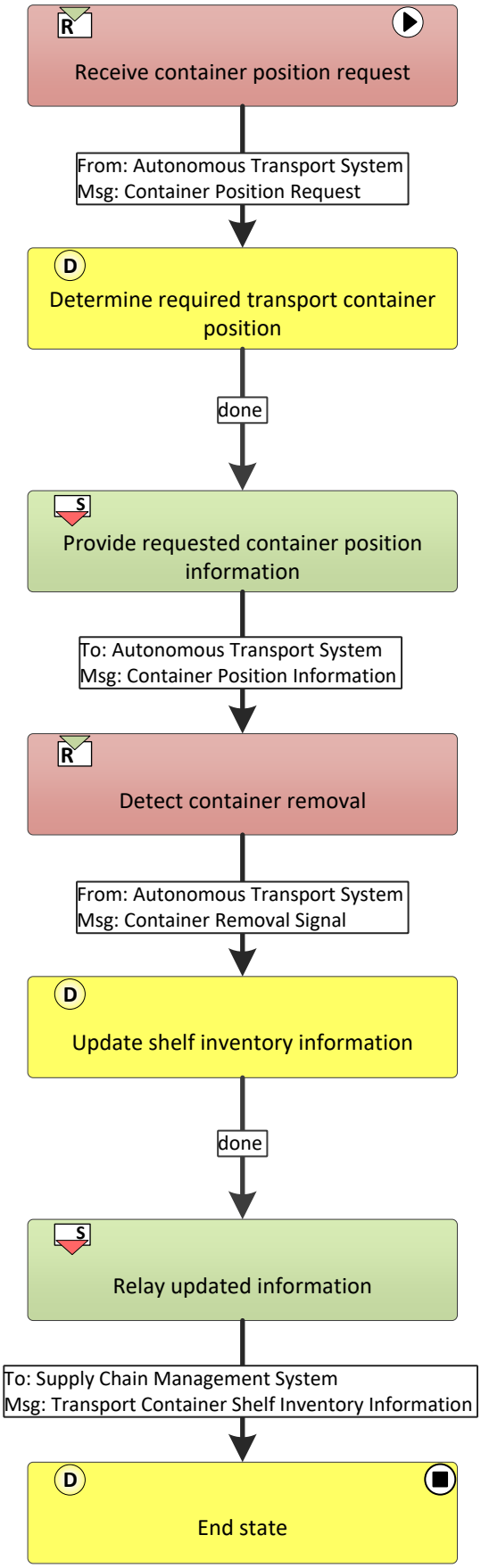
Requirement Type: Environment Requirement
Requirement Description: The inbound location should use color markers to show the correct positioning of a good
Requirement Priority: Medium

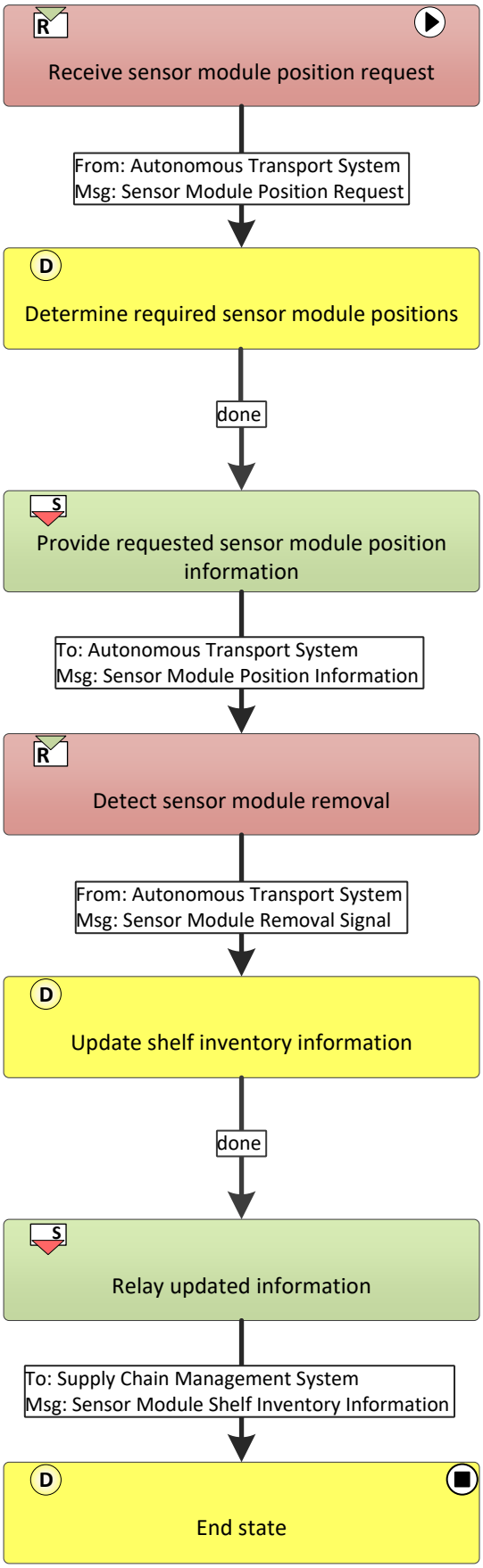
Possible Adaptations

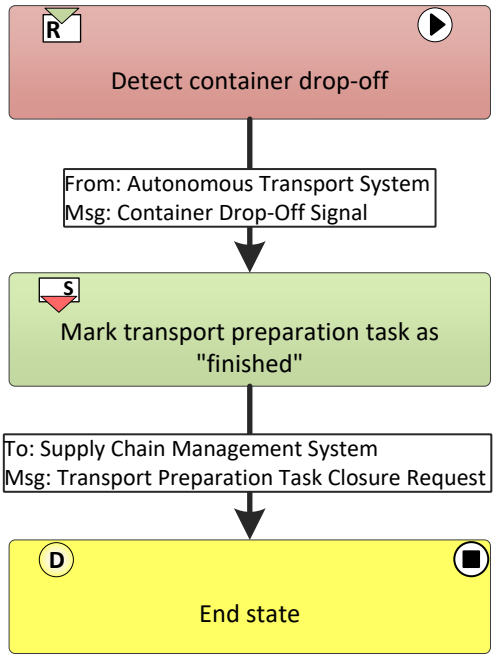
Adaptation Description: These color markers are used during the adaptations of requirement 1 to help a process supervisor resolve possible positioning problems.


Process transport assignment information
From: Inbound Location Sensor System
Msg: Transport Assignment Information
Move to inbound location
done
Transport package to preparation area
done
Move to transport container smart shelf
done
Request position of required transport container
To: Transport Container Smart Shelf
Msg: Container Position Request
Receive container position information
From: Transport Container Smart Shelf
Msg: Container Position Information
Pick up correct container
To: Transport Container Smart Shelf
Msg: Container Removal Signal
Transport container to preparation area
done
Move to sensor module smart shelf
done
Request position of required sensor modules
To: Sensor Module Smart Shelf
Msg: Sensor Module Position Request
Receive sensor module position information
From: Sensor Module Smart Shelf
Msg: Sensor Module Position Information
Pick up correct sensor modules
To: Sensor Module Smart Shelf
Msg: Sensor Module Removal Signal
Transport sensor modules to preparation area
done
Install sensor modules
done
Place package in container
done
Close container
done
Transport container to outbound location
To: Outbound Location Sensor System
Msg: Container Drop-Off Signal
End state


Receive transport preparation task information
From: Inbound Location Sensor System
Msg: Transport Preparation Task Information
Save new transport preparation task
done
Receive transport container shelf inventory information
From: Transport Container Smart Shelf
Msg: Transport Container Shelf Inventory Information
Update transport container shelf inventory information
done
Receive sensor module shelf inventory information
From: Sensor Module Smart Shelf
Msg: Sensor Module Shelf Inventory Information
Update sensor module shelf inventory information
done
Receive transport preparation task closure request
From: Outbound Location Sensor System
Msg: Transport Preparation Task Closure Request
Close transport preparation task


R
Receive container position request
From: Autonomous Transport System
Msg: Container Position Request
D
Determine required transport container position
done
S
Provide requested container position information
To: Autonomous Transport System
Msg: Container Position Information
R
Detect container removal
From: Autonomous Transport System
Msg: Container Removal Signal
D
Update shelf inventory information
done
S
Relay updated information
To: Supply Chain Management System
Msg: Transport Container Shelf Inventory Information
D
End state


R
Receive sensor module position request
From: Autonomous Transport System
Msg: Sensor Module Position Request
D
Determine required sensor module positions
done
S
Provide requested sensor module position information
To: Autonomous Transport System
Msg: Sensor Module Position Information
R
Detect sensor module removal
From: Autonomous Transport System
Msg: Sensor Module Removal Signal
D
Update shelf inventory information
done
S
Relay updated information
To: Supply Chain Management System
Msg: Sensor Module Shelf Inventory Information
D
End state


R
Detect container drop-off
From: Autonomous Transport System
Msg: Container Drop-Off Signal
S
Mark transport preparation task as "finished"
To: Supply Chain Management System
Msg: Transport Preparation Task Closure Request
D
End state