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**MESSIR** Analysis Document  
- v 0.0 -

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# Contents

<b>1</b>	<b>Introduction</b>	<b>9</b>
1.1	Overview	9
1.2	Purpose and recipients of the document	9
1.3	Application Domain	9
1.4	Definitions, acronyms and abbreviations	9
1.5	Document structure	9
<b>2</b>	<b>General Description</b>	<b>11</b>
2.1	Domain Stakeholders	11
2.2	System's Actors	12
2.3	Use Cases Model	12
2.3.1	Use Cases	12
2.3.2	Use Case Instance(s)	18
<b>3</b>	<b>Environment Model</b>	<b>21</b>
3.1	Environment model view(s)	21
3.2	Actors and Interfaces Descriptions	21
3.2.1	actAbstractDispatchCoordinator Actor	21
3.2.2	actCentralCoordinator Actor	21
3.2.3	actCommunicationCompany Actor	22
3.2.4	actFiremenCoordinator Actor	22
3.2.5	actPoliceCoordinator Actor	22
3.2.6	actTowServiceCoordinator Actor	22
<b>4</b>	<b>Concept Model</b>	<b>25</b>
4.1	PrimaryTypes-Classes	25
4.1.1	Local view 12	25
4.1.2	Local view 18	25
4.2	PrimaryTypes-Datatypes	25
4.2.1	Local view 15	25
4.2.2	Local view 16	25
4.2.3	Local view 17	25
4.3	Concept Model Types Descriptions	25
4.3.1	Primary types - Class types descriptions	29
4.3.2	Primary types - Datatypes types descriptions	31
4.3.3	Primary types - Association types descriptions	32
4.3.4	Primary types - Aggregation types descriptions	33
4.3.5	Secondary types - Class types descriptions	33
4.3.6	Secondary types - Datatypes types descriptions	33
4.3.7	Secondary types - Association types descriptions	34

4.3.8	Secondary types - Aggregation types descriptions . . . . .	34
4.3.9	Secondary types - Composition types descriptions . . . . .	34
<b>5</b>	<b>Operation Model . . . . .</b>	<b>35</b>
5.1	Environment - Out Interface Operation Scheme for actAbstractDispatchCoordinator . . . . .	35
5.1.1	Operation Model for oeCloseCrisisEvent . . . . .	35
5.1.2	Operation Model for oeGetCrisisEventInformation . . . . .	35
5.1.3	Operation Model for oeMessage . . . . .	36
5.1.4	Operation Model for oeRefreshMap . . . . .	36
5.1.5	Operation Model for oeUpdateDispatchStatus . . . . .	37
5.2	Environment - Out Interface Operation Scheme for actCentralCoordinator . . . . .	37
5.2.1	Operation Model for oeAddNewCrisisEvent . . . . .	37
5.2.2	Operation Model for oeCreateNewCrisisEvent . . . . .	38
5.2.3	Operation Model for oeMovePinOnMap . . . . .	39
5.2.4	Operation Model for oeRequestCrisisEventLocation . . . . .	39
5.3	Environment - Out Interface Operation Scheme for actCommunicationCompany . . . . .	40
5.3.1	Operation Model for oeReceiveCrisisEventLocation . . . . .	40
5.4	Environment - Out Interface Operation Scheme for actFiremenCoordinator . . . . .	41
5.4.1	Operation Model for oeAddRequestHelp . . . . .	41
5.4.2	Operation Model for oeRequestHelp . . . . .	41
5.5	Environment - Actor Operation Schemes . . . . .	42
5.6	Primary Types - Operation Schemes for Classes . . . . .	42
5.7	Primary Types - Operation Schemes for Datatypes . . . . .	42
5.8	Primary Types - Operation Schemes for Enumerations . . . . .	42
5.9	Secondary Types - Operation Schemes for Classes . . . . .	42
5.10	Secondary Types - Operation Schemes for Datatype dtMapWithPin . . . . .	42
5.10.1	Operation Model for addPinToMap . . . . .	42
5.10.2	Operation Model for getPinGeoPos . . . . .	43
5.10.3	Operation Model for removeAllPinsFromMap . . . . .	43
5.11	Secondary Types - Operation Schemes for Enumerations . . . . .	43
<b>6</b>	<b>Test Model(s) . . . . .</b>	<b>45</b>
<b>7</b>	<b>Additional Constraints . . . . .</b>	<b>47</b>
<b>A</b>	<b>Undocumented Messir Specification Elements . . . . .</b>	<b>49</b>
A.1	Undocumented Use Cases . . . . .	49
A.1.1	Undocumented Use Cases - Subfunction Level . . . . .	49
<b>B</b>	<b>Messir Specification Files Listing . . . . .</b>	<b>51</b>
B.1	File /src-gen/messir-spec/.views.msr . . . . .	51
B.2	File /.../environment-actAbstractDispatchCoordinator-oeCloseCrisisEvent.msr . . . . .	51
B.3	File /.../environment-actAbstractDispatchCoordinator-oeGetCrisisEventInformation.msr . . . . .	51
B.4	File /src-gen.../environment-actAbstractDispatchCoordinator-oeMessage.msr . . . . .	52
B.5	File /src-gen.../environment-actAbstractDispatchCoordinator-oeRefreshMap.msr . . . . .	52
B.6	File /.../environment-actAbstractDispatchCoordinator-oeUpdateDispatchStatus.msr . . . . .	53
B.7	File /src-gen.../environment-actCentralCoordinator-oeAddNewCrisisEvent.msr . . . . .	53
B.8	File /.../environment-actCentralCoordinator-oeConfirmCrisisEventLocation.msr . . . . .	53
B.9	File /src-gen.../environment-actCentralCoordinator-oeCreateNewCrisisEvent.msr . . . . .	54
B.10	File /.../environment-actCentralCoordinator-oeInitialiseNewCrisisEvent.msr . . . . .	56

B.11	File /src-gen.../environment-actCentralCoordinator-oeMovePinOnMap.msr . . . . .	56
B.12	File /.../environment-actCentralCoordinator-oeRequestCrisisEventLocation.msr . .	57
B.13	File /.../environment-actCommunicationCompany-oeReceiveCrisisEventLocation.msr	57
B.14	File /src-gen.../environment-actFiremenCoordinator-oeAddRequestHelp.msr . . . . .	58
B.15	File /src-gen.../environment-actFiremenCoordinator-oeRequestHelp.msr . . . . .	58
B.16	File /src-gen/messir-spec/environment/environment.msr . . . . .	59
B.17	File /src-gen/messir-spec/concepts.../primarytypes-associations.msr . . . . .	60
B.18	File /src-gen/messir-spec/concepts/primarytypes-classes/primarytypes-classes.msr .	61
B.19	File /src-gen/messir-spec/concepts.../primarytypes-datatypes.msr . . . . .	63
B.20	File /src-gen/messir-spec/concepts.../secondarytypes-associations.msr . . . . .	64
B.21	File /src-gen/messir-spec/concepts.../secondarytypes-classes.msr . . . . .	64
B.22	File /src-gen.../secondarytypes-datatypes-dtMapWithPin-addPinToMap.msr . . . . .	64
B.23	File /src-gen.../secondarytypes-datatypes-dtMapWithPin-getPinGeoPos.msr . . . . .	65
B.24	File /src-gen.../secondarytypes-datatypes-dtMapWithPin-removeAllPinsFromMap.msr	65
B.25	File /src-gen/messir-spec/concepts.../secondarytypes-datatypes.msr . . . . .	66
B.26	File /src-gen/messir-spec/tests/tests.msr . . . . .	66
B.27	File /.../usecaseinstance-ugCreateNewCrisisEvent-uciugCreateNewCrisisEvent.msr .	67
B.28	File /.../usecaseinstance-ugGlobalDispatchManagement-uciugGlobalDispatchManagement.msr	68
B.29	File /src-gen/messir-spec/usecases/usecases.msr . . . . .	69

# List of Figures

2.1	lu.uni.lassy.excalibur.group09.spec Use Case Diagram: uc-suGlobalManagementOfEvent	13
2.2	lu.uni.lassy.excalibur.group09.spec Use Case Diagram: uc-ugCreateNewCrisisEvent . .	15
2.3	lu.uni.lassy.excalibur.group09.spec Use Case Diagram: uc-ugGlobalDispatchManagement	17
2.4	lu.uni.lassy.excalibur.group09.spec Sequence Diagram: uci-uciugCreateNewCrisiEvent .	18
2.5	lu.uni.lassy.excalibur.group09.spec Sequence Diagram: uci-uciugGlobalDispatchManagement	20
4.1	Concept Model - PrimaryTypes-Classes local view 12 - Main view of the concept model	26
4.2	Concept Model - PrimaryTypes-Classes local view 18 - View of the actors and operations re	27
4.3	Concept Model - PrimaryTypes-Datatypes local view 15 - View of all the datatypes . .	28
4.4	Concept Model - PrimaryTypes-Datatypes local view 16 - View of all the different modes for	29
4.5	Concept Model - PrimaryTypes-Datatypes local view 17 - View of 'mapWithPin' and its relatio	30



# Listings

B.1	Messir Spec. file .views.msr.	51
B.2	Messir Spec. file environment-actAbstractDispatchCoordinator-oeCloseCrisisEvent.msr.	51
B.3	Messir Spec. file environment-actAbstractDispatchCoordinator-oeGetCrisisEventInformation.msr.	51
B.4	Messir Spec. file environment-actAbstractDispatchCoordinator-oeMessage.msr.	52
B.5	Messir Spec. file environment-actAbstractDispatchCoordinator-oeRefreshMap.msr.	52
B.6	Messir Spec. file environment-actAbstractDispatchCoordinator-oeUpdateDispatchStatus.msr.	53
B.7	Messir Spec. file environment-actCentralCoordinator-oeAddNewCrisisEvent.msr.	53
B.8	Messir Spec. file environment-actCentralCoordinator-oeConfirmCrisisEventLocation.msr.	53
B.9	Messir Spec. file environment-actCentralCoordinator-oeCreateNewCrisisEvent.msr.	54
B.10	Messir Spec. file environment-actCentralCoordinator-oeInitialiseNewCrisisEvent.msr.	56
B.11	Messir Spec. file environment-actCentralCoordinator-oeMovePinOnMap.msr.	56
B.12	Messir Spec. file environment-actCentralCoordinator-oeRequestCrisisEventLocation.msr.	57
B.13	Messir Spec. file environment-actCommunicationCompany-oeReceiveCrisisEventLocation.msr.	57
B.14	Messir Spec. file environment-actFiremenCoordinator-oeAddRequestHelp.msr.	58
B.15	Messir Spec. file environment-actFiremenCoordinator-oeRequestHelp.msr.	58
B.16	Messir Spec. file environment.msr.	59
B.17	Messir Spec. file primarytypes-associations.msr.	60
B.18	Messir Spec. file primarytypes-classes.msr.	61
B.19	Messir Spec. file primarytypes-datatypes.msr.	63
B.20	Messir Spec. file secondarytypes-associations.msr.	64
B.21	Messir Spec. file secondarytypes-classes.msr.	64
B.22	Messir Spec. file secondarytypes-datatypes-dtMapWithPin-addPinToMap.msr.	64
B.23	Messir Spec. file secondarytypes-datatypes-dtMapWithPin-getPinGeoPos.msr.	65
B.24	Messir Spec. file secondarytypes-datatypes-dtMapWithPin-removeAllPinsFromMap.msr.	65
B.25	Messir Spec. file secondarytypes-datatypes.msr.	66
B.26	Messir Spec. file tests.msr.	66
B.27	Messir Spec. file usecaseinstance-ugCreateNewCrisisEvent-uciugCreateNewCrisisEvent.msr.	67
B.28	Messir Spec. file usecaseinstance-ugGlobalDispatchManagement-uciugGlobalDispatchManagement.msr.	68
B.29	Messir Spec. file usecases.msr.	69



# **Chapter 1**

## **Introduction**

**1.1 Overview**

**1.2 Purpose and recipients of the document**

**1.3 Application Domain**

**1.4 Definitions, acronyms and abbreviations**

**1.5 Document structure**



## Chapter 2

# General Description

### 2.1 Domain Stakeholders

## 2.2 System's Actors

The objective of this section is not to provide the full requirement elicitation document in this section but to reuse a part of this document to provide a informal introduction to the **Messip** specification of the system under development. The use case model is made of a use case diagrams modelling abstractly and informally the actors and their use cases together with a set of use cases descriptions. In addition, those diagrams and description tables are adapted to the **Messip** specification since actor and messages names together with parameters are partly adapted to be consistent with the specification identifiers (see [1] for more details).

## 2.3 Use Cases Model

This section contains the use cases elicited during the requirements elicitation phase. The use cases are textually described as suggested by the **Messip** method and inspired by the standard Cokburn template [2].

### 2.3.1 Use Cases

#### 2.3.1.1 summary-suGlobalManagementOfEvent

The goal is to manage the creation of a new crisis event including all the necessary information and to have the requested coordinators arrive on the crisis event's location.

USE-CASE DESCRIPTION	
Name	suGlobalManagementOfEvent
Scope	system
Level	summary
<i>Primary actor(s)</i>	
1	actCentralCoordinator[active]
<i>Secondary actor(s)</i>	
1	actCommunicationCompany[active]
2	actFiremenCoordinator[active]
3	actTowServiceCoordinator[active]
<i>Goal(s) description</i>	
The goal is to manage the creation of a new crisis event including all the necessary information and to have the requested coordinators arrive on the crisis event's location.	
<i>Reuse</i>	
1	<u>ugCreateNewCrisisEvent</u> [1..*]
2	<u>ugGlobalDispatchManagement</u> [1..*]
<i>Protocol condition(s)</i>	
1	none.
<i>Pre-condition(s)</i>	
1	none.
<i>Main post-condition(s)</i>	
1	a new crisis event has been created and modifications have been made by the coordinators to the system and its environment concerning a crisis event.
<i>Main Steps</i>	
a	the actor actCentralCoordinator executes the <u>ugCreateNewCrisisEvent</u> use case
<i>continues in next page ...</i>	

**... Use-Case Description table continuation**

b	the actor	actFiremenCoordinator	executes the	<u>ugGlobalDispatchManagement</u>	use case
c	the actor	actTowServiceCoordinator	executes the	<u>ugGlobalDispatchManagement</u>	use case
<b>Steps Ordering Constraints</b>					
1	step (a) must be executed before step (b) or step (c)				
2	step (b) XOR step (c)				
<b>Additional Information</b>					
none					

Figure 2.1 Shows the suGlobalManagementOfEvent use-case and its actors.

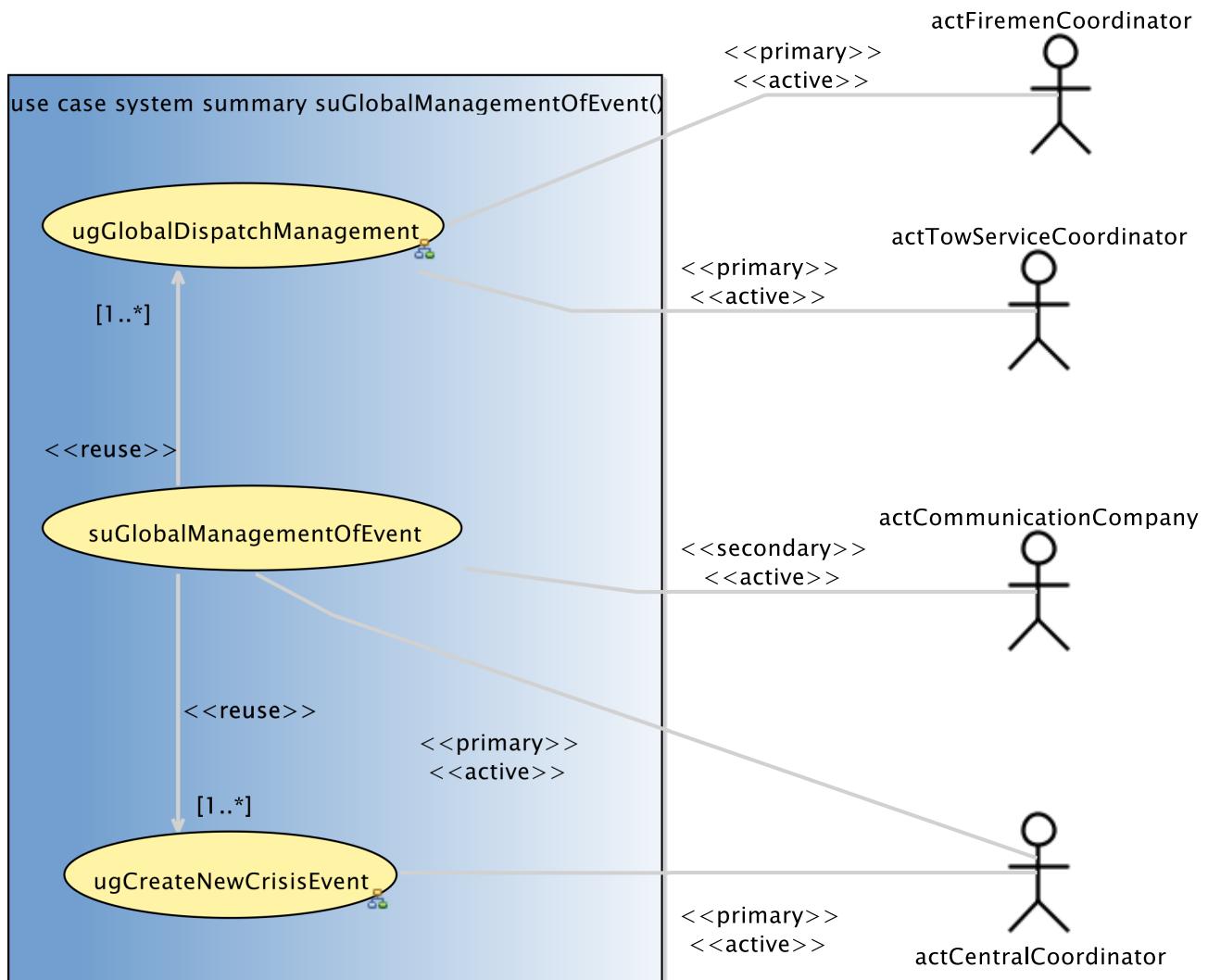


Figure 2.1:

### 2.3.1.2 usergoal-ugCreateNewCrisisEvent

The goal is to manage the creation of a new crisis event including all the necessary information.

USE-CASE DESCRIPTION	
Name	ugCreateNewCrisisEvent
Scope	system
Level	usergoal
<b>Primary actor(s)</b>	
1	actCentralCoordinator [active]
<b>Secondary actor(s)</b>	
1	actCommunicationCompany [active]
2	actFiremenCoordinator [passive]
3	actTowServiceCoordinator [passive]
<b>Goal(s) description</b>	
The goal is to manage the creation of a new crisis event including all the necessary information.	
<b>Reuse</b>	
1	<u>oeAddNewCrisisEvent [1..*]</u>
2	<u>oeRequestCrisisEventLocation [0..*]</u>
3	<u>oeReceiveCrisisEventLocation [0..*]</u>
4	<u>oeCreateNewCrisisEvent [1..*]</u>
5	<u>oeMovePinOnMap [0..*]</u>
<b>Protocol condition(s)</b>	
1	none.
<b>Pre-condition(s)</b>	
1	none.
<b>Main post-condition(s)</b>	
1	a dispatch order including the crisis event's information such as the id, map with pins, witness's phone number, etc. is sent to nearest, free Firemen Team and Tow Service Team.
<b>Main Steps</b>	
a	the actor actCentralCoordinator executes the <u>oeAddNewCrisisEvent</u> use case
b	the actor actCentralCoordinator executes the <u>oeRequestCrisisEventLocation</u> use case
c	the actor actCommunicationCompany executes the <u>oeReceiveCrisisEventLocation</u> use case
d	the actor actCentralCoordinator executes the <u>oeMovePinOnMap</u> use case
e	the actor actCentralCoordinator executes the <u>oeCreateNewCrisisEvent</u> use case
<b>Steps Ordering Constraints</b>	
1	step (a) must be executed first
2	if step (c) then previously step (b)
3	if step (d) then previously step (c)
4	step (e) executed as last
5	step (a), (b), (c), (e) must be executed at least once
<b>Additional Information</b>	
none	

Figure 2.2 Shows the ugCreateNewCrisisEvent use-case and its actors.

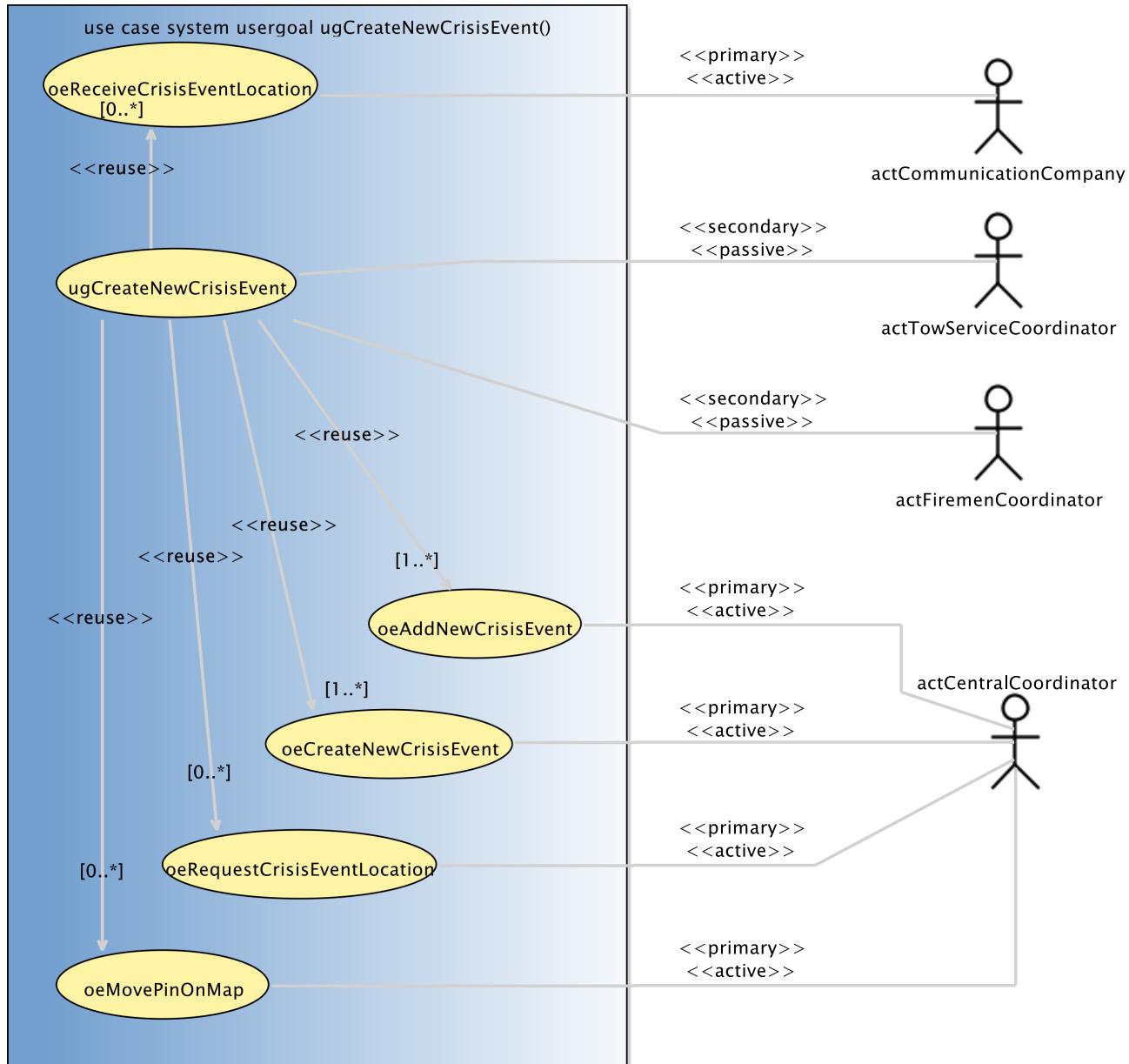


Figure 2.2: ugCreateNewCrisisEvent

### 2.3.1.3 usergoal-ugGlobalDispatchManagement

The goal is to have the requested coordinators arrive on the crisis event's location.

USE-CASE DESCRIPTION	
Name	ugGlobalDispatchManagement
Scope	system
Level	usergoal
<b>Primary actor(s)</b>	
1	actFiremenCoordinator [active]
2	actTowServiceCoordinator [active]
<b>Secondary actor(s)</b>	
1	actCentralCoordinator [passive]
2	actPoliceCoordinator [active]
<b>Goal(s) description</b>	
The goal is to have the requested coordinators arrive on the crisis event's location.	
<b>Reuse</b>	
1	<u>oeGetCrisisEventInformation</u> [2..*]
2	<u>oeUpdateDispatchStatus</u> [4..*]
3	<u>oeRefreshMap</u> [0..*]
4	<u>oeMessage</u> [0..*]
5	<u>oeRequestHelp</u> [0..*]
6	<u>oeCloseCrisisEvent</u> [2..*]
7	<u>oeAddRequestHelp</u> [0..*]
<b>Protocol condition(s)</b>	
1	none.
<b>Pre-condition(s)</b>	
1	the sender is associated to a crisis event.
<b>Main post-condition(s)</b>	
1	modifications have been made to the system and its environment concerning a crisis event.
<b>Main Steps</b>	
a	the actor actFiremenCoordinator executes the <u>oeGetCrisisEventInformation</u> use case
b	the actor actFiremenCoordinator executes the <u>oeUpdateDispatchStatus</u> use case
c	the actor actTowServiceCoordinator executes the <u>oeGetCrisisEventInformation</u> use case
d	the actor actTowServiceCoordinator executes the <u>oeUpdateDispatchStatus</u> use case
e	the actor actTowServiceCoordinator executes the <u>oeRefreshMap</u> use case
f	the actor actTowServiceCoordinator executes the <u>oeMessage</u> use case
g	the actor actFiremenCoordinator executes the <u>oeAddRequestHelp</u> use case
h	the actor actFiremenCoordinator executes the <u>oeRequestHelp</u> use case
i	the actor actPoliceCoordinator executes the <u>oeGetCrisisEventInformation</u> use case
j	the actor actPoliceCoordinator executes the <u>oeUpdateDispatchStatus</u> use case
k	the actor actFiremenCoordinator executes the <u>oeCloseCrisisEvent</u> use case
l	the actor actTowServiceCoordinator executes the <u>oeCloseCrisisEvent</u> use case
m	the actor actPoliceCoordinator executes the <u>oeCloseCrisisEvent</u> use case

*continues in next page ...*

**... Use-Case Description table continuation**

Steps Ordering Constraints	
1	if step (b),(d),(j) then previously step (a),(c),(i) respectively
2	if step (k),(l),(m) then previously step (b),(d),(j) at least two times respectively
3	step (h) can only be executed if step (g) has at least been executed once previously
4	if step (i) then previously step (h)
Additional Information	
none	

Figure 2.3 Shows the ugGlobalDispatchManagement use-case and its actors.

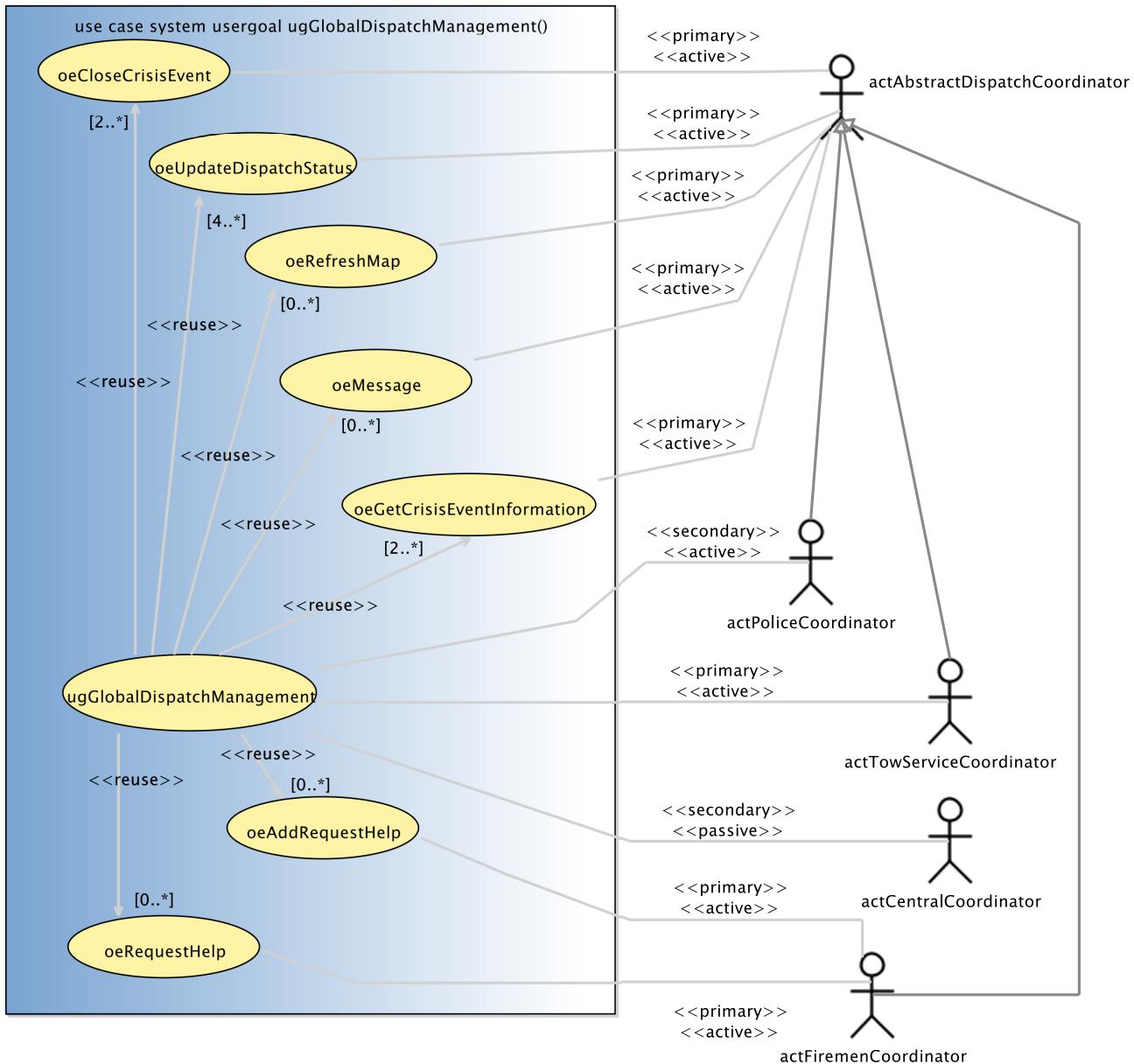


Figure 2.3: ugGlobalDispatchManagement

### 2.3.2 Use Case Instance(s)

#### 2.3.2.1 Use-Case Instance - uciugCreateNewCrisiEvent:ugCreateNewCrisisEvent

Shows the ugCreateNewCrisisEvent instance.

USERGOAL USE-CASE INSTANCE	
<i>Instantiated Use Case</i>	
ugCreateNewCrisisEvent	
<i>Instance ID</i>	
uciugCreateNewCrisiEvent	

Figure 2.4 Shows the ugCreateNewCrisisEvent instance.

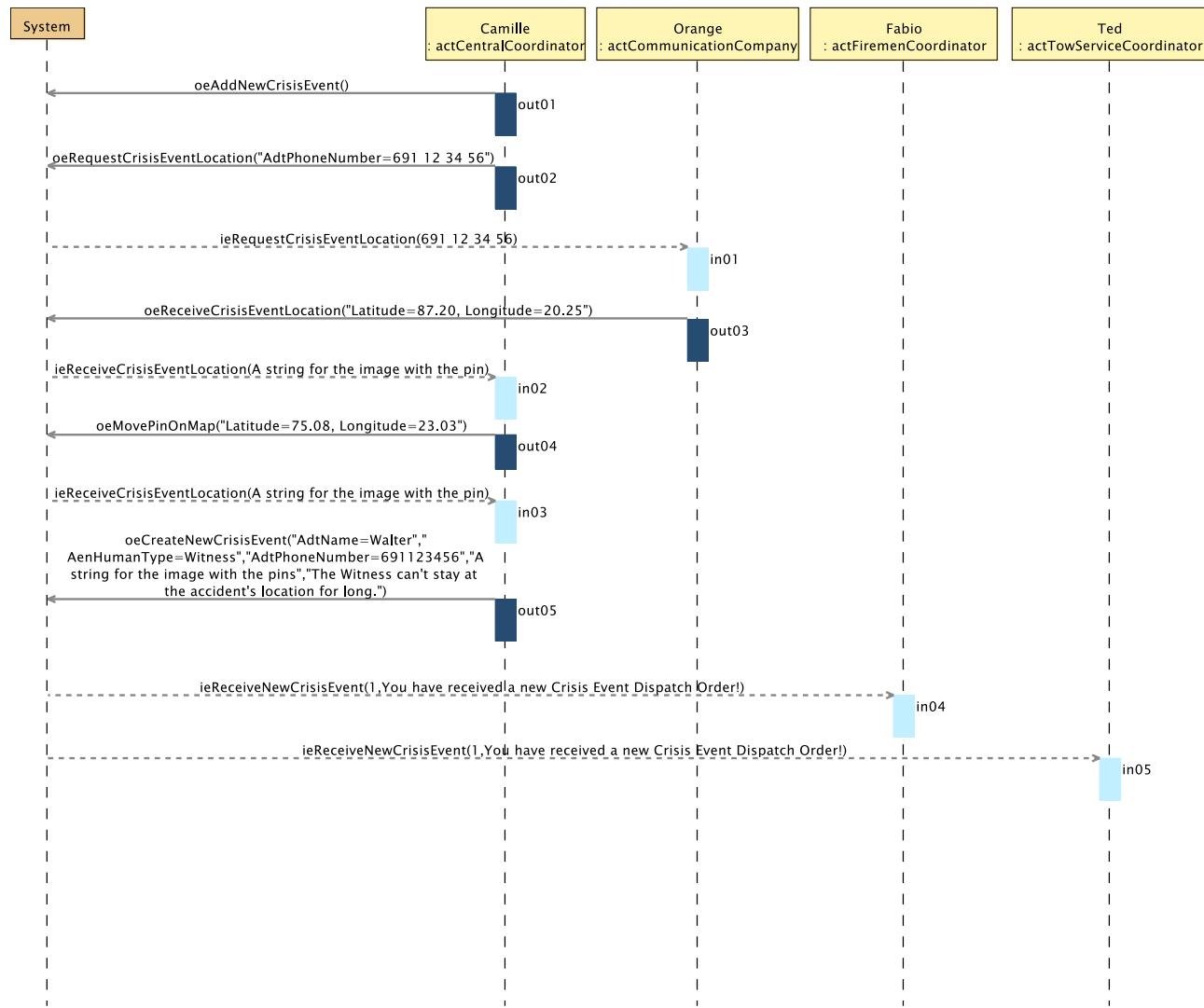


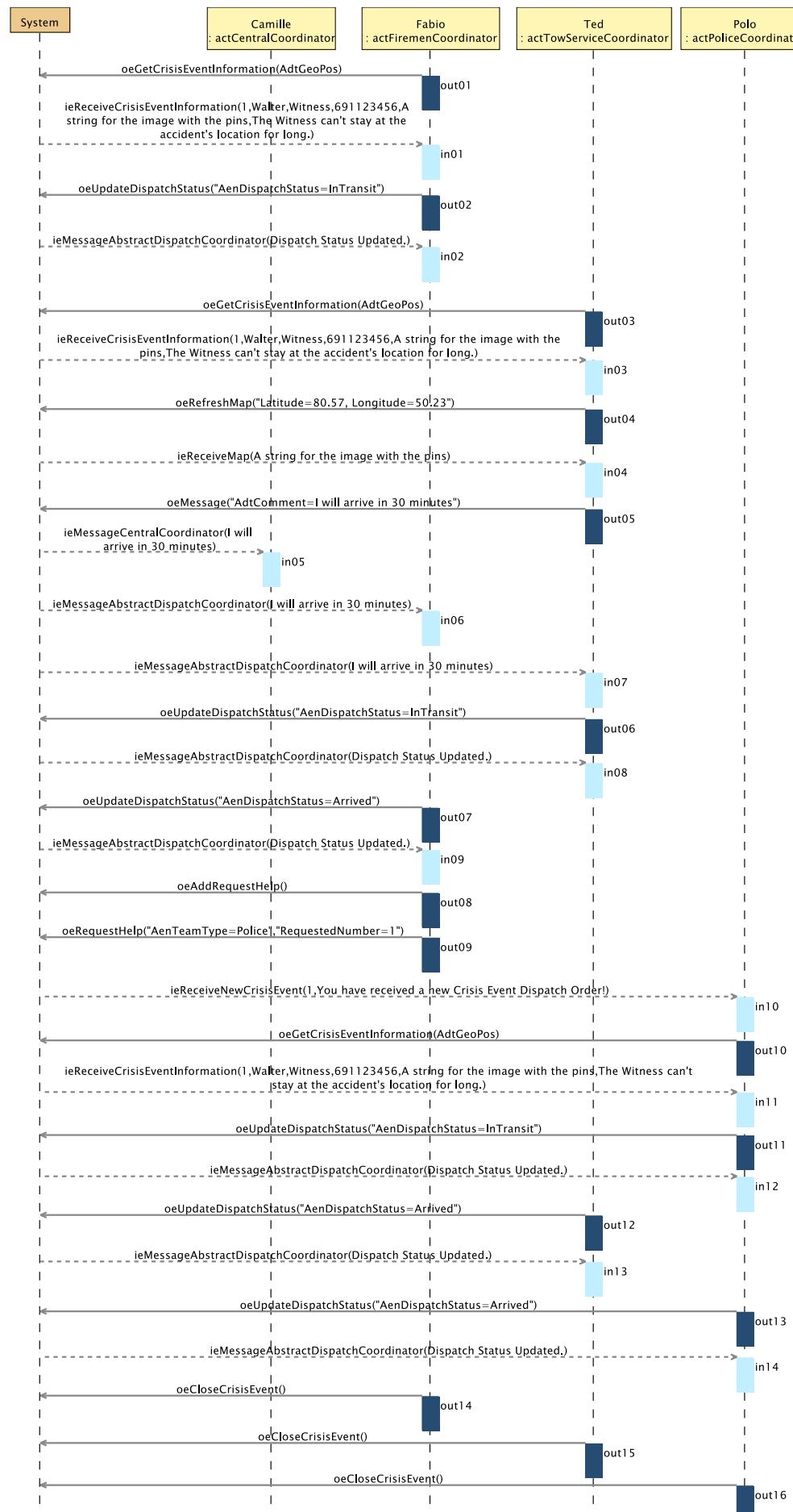
Figure 2.4: ugCreateNewCrisisEvent

**2.3.2.2 Use-Case Instance - uciugGlobalDispatchManagement:ugGlobalDispatchManagement**

Shows the ugGlobalDispatchManagement instance.

USERGOAL USE-CASE INSTANCE
<i>Instantiated Use Case</i> ugGlobalDispatchManagement
<i>Instance ID</i> uciugGlobalDispatchManagement

Figure 2.5 Shows the ugGlobalDispatchManagement instance.



# Chapter 3

## Environment Model

### 3.1 Environment model view(s)

There are no view(s) for the **Messir** environment model.

### 3.2 Actors and Interfaces Descriptions

We provide for the given views the description of the actors together with their associated input and output interface descriptions.

#### 3.2.1 **actAbstractDispatchCoordinator** Actor

ACTOR
<i>actAbstractDispatchCoordinator</i>
An abstract Actor which brings together the common operations of the FiremanCoordinator, the PoliceCoordinator and the TowServiceCoordinator.
<i>OutputInterfaces</i>
OUT 1 <b>oeMessage (AdtComment : dtComment) : ptBoolean</b>
OUT 2 <b>oeUpdateDispatchStatus (AetDispatchStatus : etDispatchStatus) : ptBoolean</b>
<i>InputInterfaces</i>
IN 1 <b>ieReceiveNewCrisisEvent (AdtCrisisID : dtCrisisID, AMesssage : dtString) : ptBoolean</b>
IN 2 <b>ieMessageAbstractDispatchCoordinator (AdtComment : dtComment) : ptBoolean</b>

#### 3.2.2 **actCentralCoordinator** Actor

ACTOR
<i>actCentralCoordinator</i>
Is representing the person that receives the victim's or witness' call in the emergency central.
<i>OutputInterfaces</i>
OUT 1 <b>oeRequestCrisisEventLocation (AdtPhoneNumber : dtPhoneNumber) : ptBoolean</b>

*continues in next page ...*

*... Actor table continuation*

OUT 2	<code>oeCreateNewCrisisEvent (AName:dtString, AetHumanType:etHumanType, AdtPhoneNumber:dtPhoneNumber, AdtMapWithPin:dtMapWithPin, AdtComment:dtComment) :ptBoolean</code>
-------	---

*InputInterfaces*

IN 1	<code>ieReceiveCrisisEventLocation (AdtMapWithPin:dtMapWithPin) :ptBoolean</code>
------	---

IN 2	<code>ieMessageCentralCoordinator (AdtComment:dtComment) :ptBoolean</code>
------	--

**3.2.3 actCommunicationCompany Actor****ACTOR***actCommunicationCompany*

Is representing any communication company in Luxembourg.

*OutputInterfaces*

OUT 1	<code>oeReceiveCrisisEventLocation (AdtGeoPos:dtGeoPos) :ptBoolean</code>
-------	---

*InputInterfaces*

IN 1	<code>ieRequestCrisisEventLocation (AdtPhoneNumber:dtPhoneNumber) :ptBoolean</code>
------	---

**3.2.4 actFiremenCoordinator Actor****ACTOR***actFiremenCoordinator*

Is representing any firemen team leader able to manage a two Ambulances.

*Extends*

lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator

*OutputInterfaces*

OUT 1	<code>oeRequestHelp (AetTeamType:etTeamType, ARequestedNumber:ptInteger) :ptBoolean</code>
-------	--

**3.2.5 actPoliceCoordinator Actor****ACTOR***actPoliceCoordinator*

Is representing a police team leader.

*Extends*

lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator

**3.2.6 actTowServiceCoordinator Actor**

ACTOR
<i>actTowServiceCoordinator</i>
Is representing a tow service driver.
<i>Extends</i>
lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator



# Chapter 4

## Concept Model

### 4.1 PrimaryTypes-Classes

#### 4.1.1 Local view 12

Figure 4.1 Main view of the concept model

#### 4.1.2 Local view 18

Figure 4.2 View of the actors and operations regarding a dispatched coordinator

### 4.2 PrimaryTypes-Datatypes

#### 4.2.1 Local view 15

Figure 4.3 View of all the datatypes

#### 4.2.2 Local view 16

Figure 4.4 View of all the different modes for the coordinators/actors

#### 4.2.3 Local view 17

Figure 4.5 View of 'mapWithPin' and its relationships

### 4.3 Concept Model Types Descriptions

This section provides the textual descriptions of all the types defined in the concept model and that can be part of the graphical views provided.

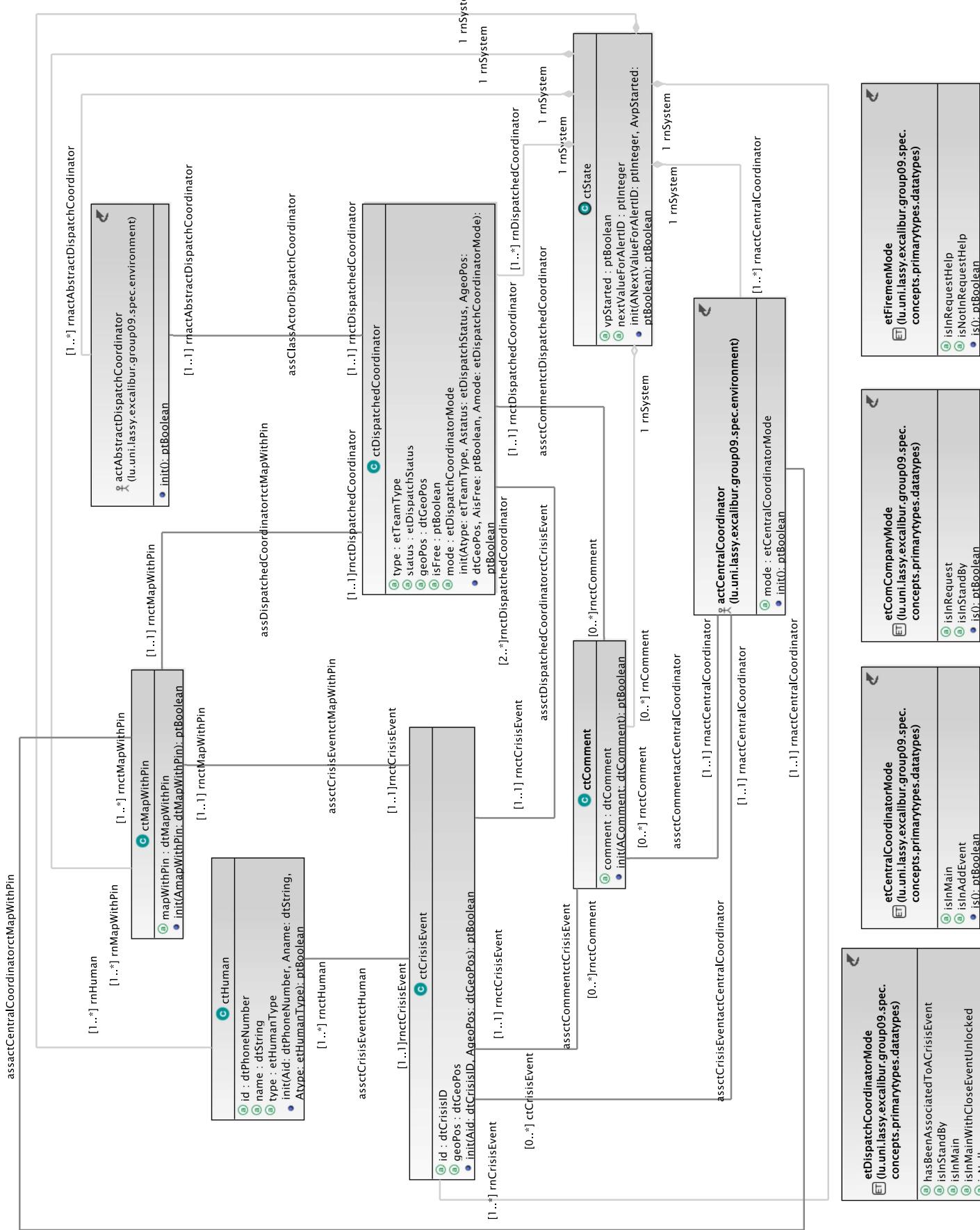


Figure 4.1: Concept Model - PrimaryTypes-Classes local view 12. Main view of the concept model.

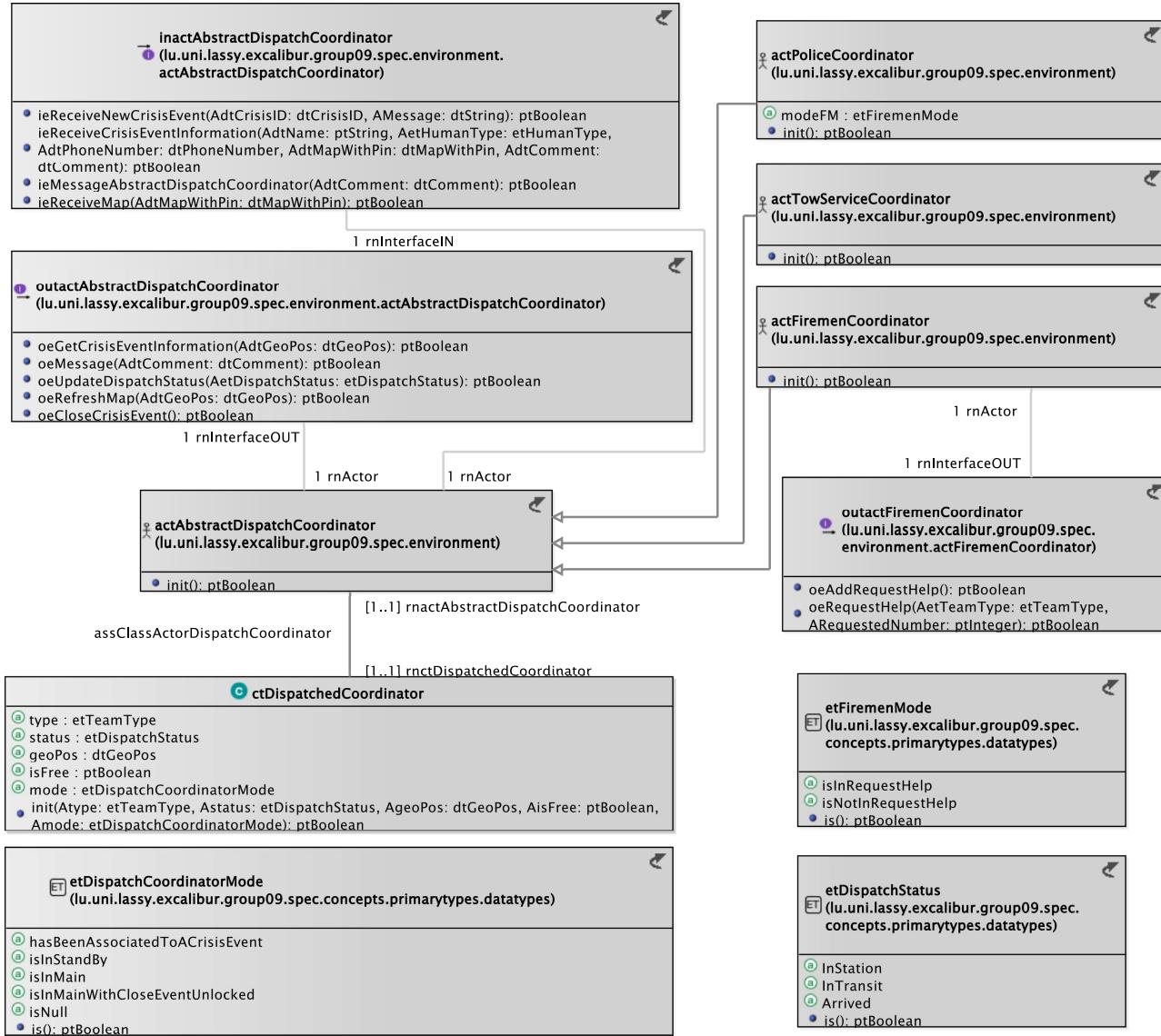


Figure 4.2: Concept Model - PrimaryTypes-Classes local view 18. View of the actors and operations regarding a dispatched coordinator.

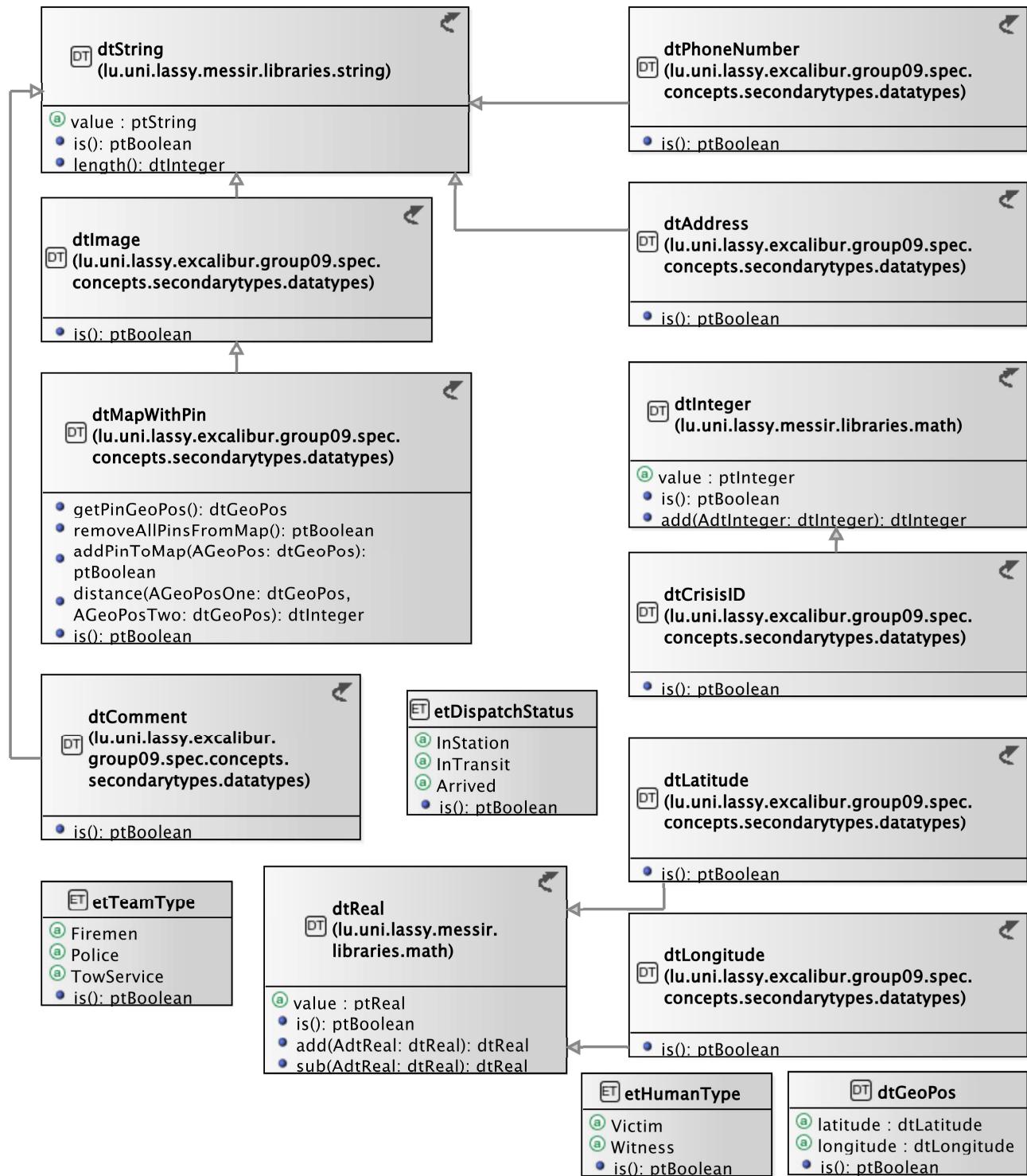


Figure 4.3: Concept Model - PrimaryTypes-Datatypes local view 15. View of all the datatypes.

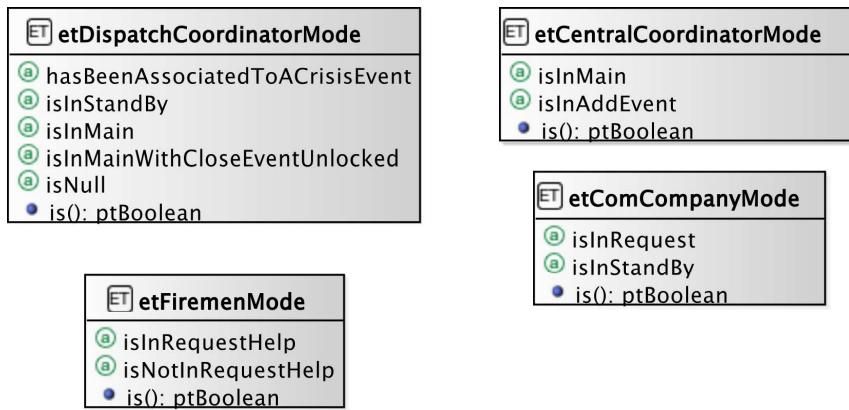


Figure 4.4: Concept Model - PrimaryTypes-Datatypes local view 16. View of all the different modes for the coordinators/actors.

#### 4.3.1 Primary types - Class types descriptions

The table below is providing comments on the graphical views given for the class types of the primary types. Type logical operations are precisely specified in the operation model.

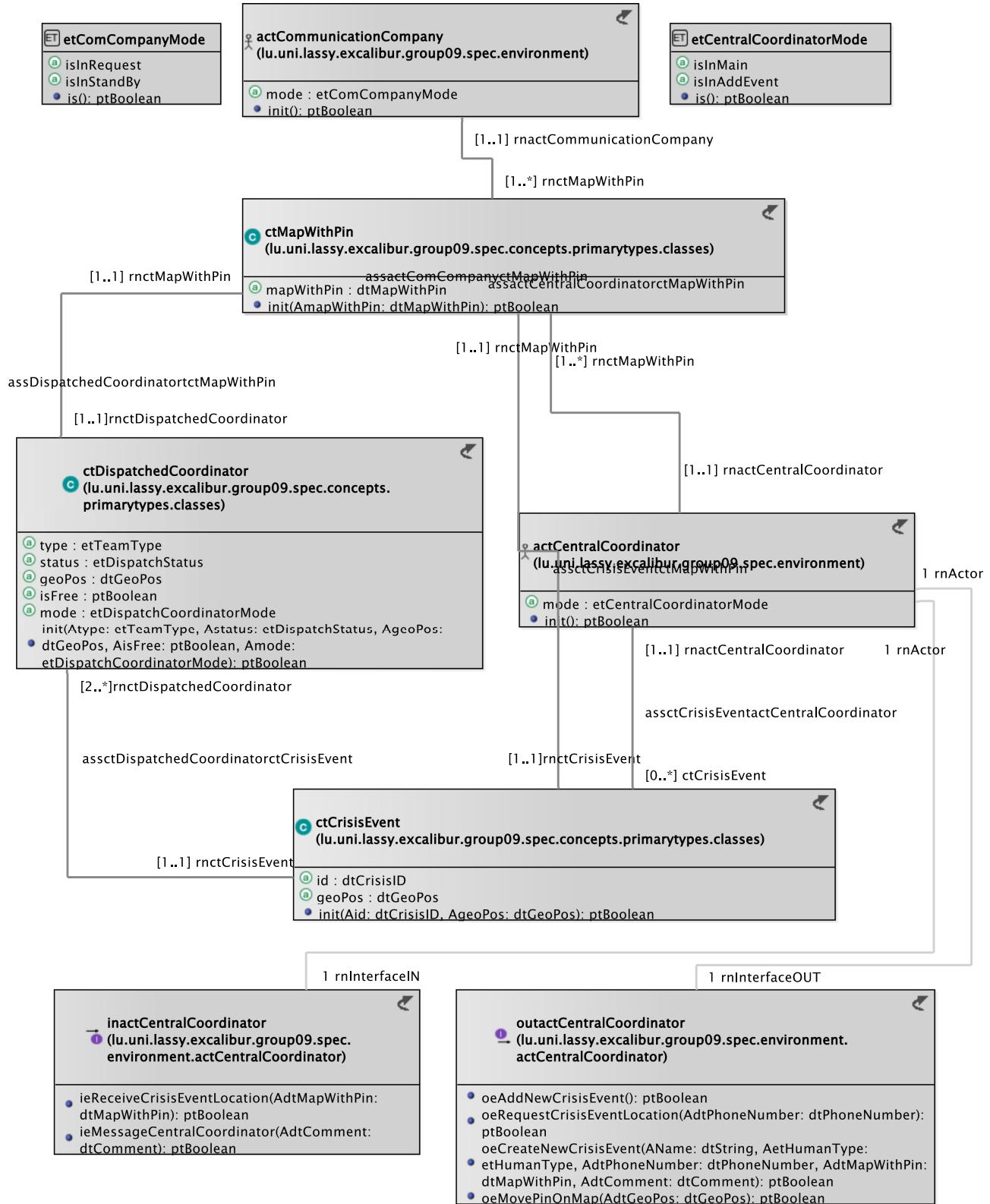


Figure 4.5: Concept Model - PrimaryTypes-Datatypes local view 17. View of 'mapWithPin' and its relationships.

CLASSES	
<i>ctComment</i>	
A class containing a comment.	
attribute	<b>comment:</b> dtComment
operation	<b>init (AComment:dtComment) :ptBoolean</b>
<i>ctCrisisEvent</i>	
A class containing the attributes identifying a crisis event.	
attribute	<b>id:</b> dtCrisisID
operation	<b>init (Aid:dtCrisisID, AgeoPos:dtGeoPos) :ptBoolean</b>
<i>ctDispatchedCoordinator</i>	
A class containing the attributes identifying a dispatched team.	
attribute	<b>status:</b> etDispatchStatus
attribute	<b>type:</b> etTeamType
operation	<b>init (Atype:etTeamType, Astatus:etDispatchStatus, AgeoPos:dtGeoPos, AisFree:ptBoolean, Amode:etDispatchCoordinatorMode) :ptBoolean</b>
<i>ctHuman</i>	
A class containing the attributes identifying an human.	
attribute	<b>id:</b> dtPhoneNumber
attribute	<b>name:</b> dtString
attribute	<b>type:</b> etHumanType
operation	<b>init (Aid:dtPhoneNumber, Aname:dtString, Atype:etHumanType) :ptBoolean</b>
<i>ctMapWithPin</i>	
A class containing an image which is the map including the pins.	
attribute	<b>mapWithPin:</b> dtMapWithPin
operation	<b>init (AmapWithPin:dtMapWithPin) :ptBoolean</b>
<i>ctState</i>	
used to model the system.	
attribute	<b>vpStarted:</b> ptBoolean
operation	<b>init (ANextValueForAlertID:ptInteger, AvpStarted:ptBoolean) :ptBoolean</b>

#### 4.3.2 Primary types - Datatypes types descriptions

The table below is providing comments on the graphical views given for the datatype types of the primary types.

<b>DATATYPES</b>	
<i>dtGeoPos</i>	
	Two Real numbers used to identify a geographical position on earth.
attribute	<b>latitude:</b> <code>dtLatitude</code>
attribute	<b>longitude:</b> <code>dtLongitude</code>
operation	<code>is() :ptBoolean</code>

<b>ENUMERATIONS</b>	
<i>etCentralCoordinatorMode</i>	
	Modes of the Central Coordinator to identify what operations he/she can do at what moment.
operation	<code>is() :ptBoolean</code>
<i>etComCompanyMode</i>	
	Modes of the Communication Company to identify what operations it can do at what moment.
operation	<code>is() :ptBoolean</code>
<i>etDispatchCoordinatorMode</i>	
	Modes of a dispatched Coordinator to identify what operations he/she can do at what moment.
operation	<code>is() :ptBoolean</code>
<i>etDispatchStatus</i>	
	A String used to identify a dispatch status.
<i>etFiremenMode</i>	
	Additional mode for the Firemen Coordinator to identify what operations he/she can do at what moment.
operation	<code>is() :ptBoolean</code>
<i>etHumanType</i>	
	A String used to identify an Human type.
<i>etTeamType</i>	
	A String used to identify a team type.

#### 4.3.3 Primary types - Association types descriptions

The table below is providing comments on the association types of the primary types.

<b>UNDIRECTED ASSOCIATIONS</b>	
<i>assactCentralCoordinatorctMapWithPin</i>	
	association between a Central Coordinator and a map with pin.
<i>assactComCompanyctMapWithPin</i>	
	Association of a communication company to a map with pin.
<i>assClassActorDispatchCoordinator</i>	
	Association of a dispatched coordinator to an actor of the same type.
<i>assctCommentactCentralCoordinator</i>	

*continues in next page ...*

***... Undirected associations table continuation***

<i>assctCommentctCrisisEvent</i>	Association of a comment to a central coordinator actor.
<i>assctCommentctDispatchedCoordinator</i>	Association of a comment to a dispatched coordinator.
<i>assctCrisisEventactCentralCoordinator</i>	Association of a crisis event to the central coordinator actor (who created it).
<i>assctCrisisEventctHuman</i>	Association of a crisis event to an human.
<i>assctCrisisEventctMapWithPin</i>	Association of a crisis event with a MapWithPin image.
<i>assctDispatchedCoordinatorctCrisisEvent</i>	Association of a dispatched coordinator to a crisis event.
<i>assDispatchedCoordinatorctMapWithPin</i>	Association of a dispatched coordinator with a MapWithPin image.

**4.3.4 Primary types - Aggregation types descriptions**

There are no aggregation types for the primary types.

**4.3.4.1 Primary types - Composition types descriptions**

There are no composition types for the primary types.

**4.3.5 Secondary types - Class types descriptions**

There are no elements in this category in the system analysed.

**4.3.6 Secondary types - Datatypes types descriptions**

The table below is providing comments on the graphical views given for the datatype types of the secondary types.

<b>DATATYPES</b>	
<i>dtAddress</i>	A String used to identify an address.
extends	dtString
operation	<b>is () :ptBoolean</b>
<i>dtComment</i>	A String used to identify a comment.
extends	dtString
operation	<b>is () :ptBoolean</b>
<i>dtCrisisID</i>	An Integer used to identify a crisis id.

*continues in next page ...*

***... Datatypes table continuation***

<i>extends</i>	dtInteger
<i>operation</i>	<b>is () :ptBoolean</b>
<b><i>dtImage</i></b>	
A String used to identify an image.	
<i>extends</i>	dtString
<i>operation</i>	<b>is () :ptBoolean</b>
<b><i>dtLatitude</i></b>	
used to define a latitude value of a geographical positions on earth.	
<i>extends</i>	dtReal
<i>operation</i>	<b>is () :ptBoolean</b>
<b><i>dtLongitude</i></b>	
used to define a longitude value of a geographical positions on earth.	
<i>extends</i>	dtReal
<i>operation</i>	<b>is () :ptBoolean</b>
<b><i>dtMapWithPin</i></b>	
An image which is a map including pins.	
<i>extends</i>	dtImage
<i>operation</i>	<b>is () :ptBoolean</b>
<b><i>dtPhoneNumber</i></b>	
A String used to store a phone number.	
<i>extends</i>	dtString
<i>operation</i>	<b>is () :ptBoolean</b>

**4.3.7 Secondary types - Association types descriptions**

There are no association types for the secondary types.

**4.3.8 Secondary types - Aggregation types descriptions**

There are no aggregation types for the secondary types.

**4.3.9 Secondary types - Composition types descriptions**

There are no composition types for the secondary types.

# Chapter 5

## Operation Model

This section contains the operation schemes of each operation defined in either an actor, its output interface, in a primary or secondary type (class, datatype or enumeration types). The **Messir** OCL code listing is joined to the comment table.

### 5.1 Environment - Out Interface Operation Scheme for actAbstractDispatchCoordinator

#### 5.1.1 Operation Model for oeCloseCrisisEvent

The oeCloseCrisisEvent operation has the following properties:

OPERATION
<i>oeCloseCrisisEvent</i>
sent to close up the associated crisis event for the current coordinator.
<i>Return type</i>
ptBoolean
<i>Pre-Condition (protocol)</i>
PreP 1 The dispatch coordinator's mode is <code>isInMainWithCloseEventUnlocked</code> .
<i>Pre-Condition (functional)</i>
PreF 1 it is supposed that a dispatched coordinator can only be associated to a single crisis event at the same time.
<i>Post-Condition (functional)</i>
PostF 1 The coordinator's attribute <code>isFree</code> is set back to true and can thus be associated to another crisis event.
<i>Post-Condition (protocol)</i>
PostP 1 The dispatch coordinator is no longer associated to the current crisis event.
PostP 2 The dispatch coordinator's mode has been set to <code>isInStandBy</code> .

#### 5.1.2 Operation Model for oeGetCrisisEventInformation

The oeGetCrisisEventInformation operation has the following properties:

OPERATION
<i>oeGetCrisisEventInformation</i>
sent to get the stored information of the crisis event to which the dispatch coordinator is associated.

*continues in next page ...*

*... Operation table continuation*

<i>Parameters</i>	
1	<b>AdtGeoPos: dtGeoPos</b> a geographical position that identifies the actor's current position.
<i>Return type</i>	
ptBoolean	
<i>Pre-Condition (protocol)</i>	
PreP 1	The dispatch coordinator's mode is <code>hasBeenAssociatedToACrisisEvent</code> .
<i>Pre-Condition (functional)</i>	
PreF 1	it is supposed that a dispatched coordinator can only be associated to a single crisis event at the same time.
PreF 2	the GeoPos given by the coordinator is a valid one.
<i>Post-Condition (functional)</i>	
PostF 1	the map with pins returned to the coordinator includes a pin of the actor's current position and another one of the crisis event's location.
<i>Post-Condition (protocol)</i>	
PostP 1	The dispatch coordinator's mode has been set to <code>isInMain</code> .

**5.1.3 Operation Model for oeMessage**

The `oeMessage` operation has the following properties:

<b>OPERATION</b>	
<i>oeMessage</i>	
sent to transmit a message.	
<i>Parameters</i>	
1	<b>AdtComment: dtComment</b>
<i>Return type</i>	
ptBoolean	
<i>Pre-Condition (protocol)</i>	
PreP 1	The dispatch coordinator's mode has is <code>isInMain</code> or <code>isInMainWithCloseEventUnlocked</code> .
<i>Pre-Condition (functional)</i>	
PreF 1	it is supposed that a dispatched coordinator can only be associated to a single crisis event at the same time.

**5.1.4 Operation Model for oeRefreshMap**

The `oeRefreshMap` operation has the following properties:

<b>OPERATION</b>	
<i>oeRefreshMap</i>	
sent to refresh the map.	
<i>Parameters</i>	
1	<b>AdtGeoPos: dtGeoPos</b>

*continues in next page ...*

***...Operation table continuation***

<b><i>Return type</i></b>
ptBoolean
<b><i>Pre-Condition (protocol)</i></b>
PreP 1 The dispatch coordinator's is <code>isInMain</code> or <code>isInMainWithCloseEventUnlocked</code> .
<b><i>Pre-Condition (functional)</i></b>
PreF 1 it is supposed that a dispatched coordinator can only be associated to a single crisis event at the same time.
PreF 2 the GeoPos given by the coordinator is a valid one.
<b><i>Post-Condition (functional)</i></b>
PostF 1 the map with pins returned to the coordinator includes a pin of the actor's current position and another one of the crisis event's location.

**5.1.5 Operation Model for oeUpdateDispatchStatus**

The `oeUpdateDispatchStatus` operation has the following properties:

<b>OPERATION</b>
<b><i>oeUpdateDispatchStatus</i></b>
sent to update the dispatch status.
<b>Parameters</b>
1 <code>AetDispatchStatus: etDispatchStatus</code>
<b><i>Return type</i></b>
ptBoolean
<b><i>Pre-Condition (protocol)</i></b>
PreP 1 The dispatch coordinator's mode is <code>isInMain</code> .
<b><i>Pre-Condition (functional)</i></b>
PreF 1 it is supposed that a dispatched coordinator can only be associated to a single crisis event at the same time.
<b><i>Post-Condition (functional)</i></b>
PostF 1 the attribute status of the coordinator is modified either from 'InStation' to 'InTransit' or from 'InTransit' to 'Arrived'
<b><i>Post-Condition (protocol)</i></b>
PostP 1 when the attribute status of the coordinator is set to 'Arrived', the actor's mode is set to <code>isInMainWithCloseEventUnlocked</code> .

**5.2 Environment - Out Interface Operation Scheme for actCentralCoordinator****5.2.1 Operation Model for oeAddNewCrisisEvent**

The `oeAddNewCrisisEvent` operation has the following properties:

<b>OPERATION</b>
<b><i>oeAddNewCrisisEvent</i></b>
sent with the intention to add a new crisis event.

*continues in next page ...*

**... Operation table continuation**

<b>Return type</b>
ptBoolean
<b>Pre-Condition (protocol)</b>
PreP 1 The actor's mode is <code>isInMain</code> .
<b>Post-Condition (protocol)</b>
PostP 1 The actor's mode has been set to <code>isInAddEvent</code> .

**5.2.2 Operation Model for oeCreateNewCrisisEvent**

The `oeCreateNewCrisisEvent` operation has the following properties:

<b>OPERATION</b>
<b><i>oeCreateNewCrisisEvent</i></b>
sent to create a new crisis event and to alert the corresponding coordinators.
<b>Parameters</b>
1 <b>AName: dtString</b> the name of the notifier that informed the Central Coordinator of the crisis event. 2 <b>AetHumanType: etHumanType</b> the notifier can be either a victim or a witness. 3 <b>AdtPhoneNumber: dtPhoneNumber</b> the phone number of the notifier. 4 <b>AdtMapWithPin: dtMapWithPin</b> a map with pin showing the crisis event's location.
<b>Return type</b>
ptBoolean
<b>Pre-Condition (protocol)</b>
PreP 1 The actor's mode is <code>isInAddEvent</code> .
<b>Pre-Condition (functional)</b>
PreF 1 The map with pin provided by the central coordinator only has a single pin.
<b>Post-Condition (functional)</b>
PostF 1 A new crisis event is created and initialised with a new crisis event id attribute which is the <code>nextValueForAlertID@pre</code> in <code>ctState</code> and the geographical position attribute of the crisis event which is extracted from the map with pin provided by the central coordinator. PostF 2 An alert message 'You have received a new dispatch order!' together with new crisis event id is sent to a free FiremenCoordinator and a free TowServiceCoordinator that are geographically the nearest of the crisis event's location and their dispatch status attributes are set to 'InStation'. PostF 3 The new crisis event is then associated to : the central coordinator who created this instance, the two selected dispatch coordinators, the map with pin instance that has the map with pin attribute communicated by the central coordinator in the parameters, the human instance, who may be initialised, if he/she is not yet in the system state, with his/her phone number as the unique id, a name and a type (witness/victim) which are given as parameters by the central coordinator, comment instance(s) which is/are initialised if the central coordinator has given some additional comments to the crisis event.

***continues in next page ...***

***...Operation table continuation***

PostF 4	The two selected dispatch coordinators' attribute <code>isFree</code> is set to false and can thus no more be associated to another crisis event.
PostF 5	the attribute <code>nextValueForAlertID</code> in <code>ctState</code> instance should be equal to the one @pre incremented by one.
<b><i>Post-Condition (protocol)</i></b>	
PostP 1	The actor's mode is set to <code>isInMain</code> .
PostP 2	the two selected dispatch coordinators' modes are set to <code>hasBeenAssociatedToACrisisEvent</code> .
PostP 3	the selected firemen coordinator's modeFM is set to <code>isNotInRequestHelp</code> .

**5.2.3 Operation Model for oeMovePinOnMap**

The `oeMovePinOnMap` operation has the following properties:

<b>OPERATION</b>
<b><i>oeMovePinOnMap</i></b>
sent to move the pin on the map (adjustments).
<b>Parameters</b>
1 <code>AdtGeoPos: dtGeoPos</code>
<b>Return type</b>
<code>ptBoolean</code>
<b>Pre-Condition (protocol)</b>
PreP 1    The actor's mode is <code>isAddEvent</code> .
<b>Pre-Condition (functional)</b>
PreF 1    It is supposed that a map with pin has already been initialised by the communication company.
<b>Post-Condition (functional)</b>
PostF 1    The returned map has the previous pin replaced by a new one using the geographical position given by the actor.
PostF 2    The returned map only has a single pin on it.
<b>Post-Condition (protocol)</b>
PostP 1

**5.2.4 Operation Model for oeRequestCrisisEventLocation**

The `oeRequestCrisisEventLocation` operation has the following properties:

<b>OPERATION</b>
<b><i>oeRequestCrisisEventLocation</i></b>
sent to request a crisis event's location.
<b>Parameters</b>
1 <code>AdtPhoneNumber: dtPhoneNumber</code>
<b>Return type</b>
<code>ptBoolean</code>

*continues in next page ...*

***... Operation table continuation***

<b><i>Pre-Condition (protocol)</i></b>
PreP 1 The actor's mode is <code>isAddEvent</code> .
<b><i>Pre-Condition (functional)</i></b>
PreF 1 it is supposed that the phone number given by the <code>CentralCoordinator</code> is always sent to the correct communication company.
<b><i>Post-Condition (functional)</i></b>
PostF 1 the phone number can be identified by the communication company.
<b><i>Post-Condition (protocol)</i></b>
PostP 1 The communication company's mode is set to <code>isInRequest</code> .

## 5.3 Environment - Out Interface Operation Scheme for `actCommunicationCompany`

### 5.3.1 Operation Model for `oeReceiveCrisisEventLocation`

The `oeReceiveCrisisEventLocation` operation has the following properties:

<b>OPERATION</b>
<b><i>oeReceiveCrisisEventLocation</i></b>
sent to get a map with pin returned to the central coordinator.
<b>Parameters</b>
1 <code>AdtGeoPos: dtGeoPos</code>
<b>Return type</b>
<code>ptBoolean</code>
<b><i>Pre-Condition (protocol)</i></b>
PreP 1 The actor's mode is <code>isInRequest</code> .
<b><i>Pre-Condition (functional)</i></b>
PreF 1 the GeoPos given by the communication company is a valid one.
<b><i>Post-Condition (functional)</i></b>
PostF 1 A new map with pin is created and initialised with the <code>ctMapWithPin</code> using the given geographical position as base and its own inner operations (cf. Chapter 5.6).
PostF 2 The new map with pin returned to the <code>CentralCoordinator</code> includes a single pin, which is the one corresponding to the geographical position of the notifier's phone.
PostF 3 The new map with pin is then associated to the central coordinator who received it and the communication company who initialised it,
<b><i>Post-Condition (protocol)</i></b>
PostP 1 The actor's mode has been set to <code>isInStandBy</code> .

## 5.4 Environment - Out Interface Operation Scheme for actFiremenCoordinator

### 5.4.1 Operation Model for oeAddRequestHelp

The oeAddRequestHelp operation has the following properties:

OPERATION
<b>oeAddRequestHelp</b>
sent with the intention to request help from additional dispatch coordinators.
<b>Return type</b>
ptBoolean
<b>Pre-Condition (protocol)</b>
PreP 1 The firemen coordinator's mode is <code>isInMain</code> or <code>isInMainWithCloseEventUnlocked</code> . PreP 2 The firemen coordinator's modeFM is <code>isNotInRequestHelp</code> .
<b>Post-Condition (protocol)</b>
PostP 1 The firemen coordinator's modeFM is set to <code>isInRequestHelp</code> . PostP 2 The firemen coordinator's mode is set to <code>isNull</code> .

### 5.4.2 Operation Model for oeRequestHelp

The oeRequestHelp operation has the following properties:

OPERATION
<b>oeRequestHelp</b>
sent to assign additional dispatch coordinators to the associated crisis event.
<b>Parameters</b>
1 <b>AetTeamType:</b> etTeamType
2 <b>ARRequestedNumber:</b> ptInteger
<b>Return type</b>
ptBoolean
<b>Pre-Condition (protocol)</b>
PreP 1 The firemen coordinator's mode has <code>isNull</code> . PreP 2 The firemen coordinator's modeFM is <code>isInRequestHelp</code> .
<b>Pre-Condition (functional)</b>
PreF 1 it is supposed that a dispatched (or firemen) coordinator can only be associated to a single crisis event at the same time.
<b>Post-Condition (functional)</b>
PostF 1 An alert message 'You have received a new dispatch order!' is sent to one or more free FiremenCoordinator(s) and/or one or more free TowServiceCoordinator(s) and/or one or more free PoliceCoordinator(s) that are geographically the nearest of the crisis event's location. PostF 2 The new crisis event is then associated to the selected dispatch coordinator(s). PostF 3 The selected dispatch coordinator(s)' attribute <code>isFree</code> is set to false and can thus no more be associated to another crisis event.

*continues in next page ...*

***... Operation table continuation***

<b><i>Post-Condition (protocol)</i></b>	
PostP 1	The actor's mode is set to <code>isInMain</code> or <code>isInMainWithCloseEventUnlocked</code> .
PostP 2	the selected dispatch coordinator(s)' modes are set to <code>hasBeenAssociatedToACrisisEvent</code> .
PostP 3	if a firemen coordinator has been selected, his modeFM is set to <code>isNotInRequestHelp</code> .

## 5.5 Environment - Actor Operation Schemes

There are no elements in this category in the system analysed.

## 5.6 Primary Types - Operation Schemes for Classes

There are no elements in this category in the system analysed.

## 5.7 Primary Types - Operation Schemes for Datatypes

There are no elements in this category in the system analysed.

## 5.8 Primary Types - Operation Schemes for Enumerations

There are no elements in this category in the system analysed.

## 5.9 Secondary Types - Operation Schemes for Classes

There are no elements in this category in the system analysed.

## 5.10 Secondary Types - Operation Schemes for Datatype dtMapWithPin

### 5.10.1 Operation Model for addPinToMap

The `addPinToMap` operation has the following properties:

<b><i>OPERATION</i></b>	
<b><i>addPinToMap</i></b>	
used to add a pin to the map.	
<b><i>Parameters</i></b>	
1	<b><i>AGeoPos: dtGeoPos</i></b> the geographical position of the pin we want to add.
<b><i>Return type</i></b>	
ptBoolean	
<b><i>Post-Condition (functional)</i></b>	
PostF 1 The given geographical position is converted into a pin on the map.	

### 5.10.2 Operation Model for getPinGeoPos

The `getPinGeoPos` operation has the following properties:

OPERATION
<b><i>getPinGeoPos</i></b>
used to get the geographical position of the pin that is currently shown on the map (used only when there's a single pin on the map).
<b><i>Return type</i></b>
<code>dtGeoPos</code>
<b><i>Post-Condition (functional)</i></b>
PostF 1 Returns a geographical position of the pin that was on the map.

### 5.10.3 Operation Model for removeAllPinsFromMap

The `removeAllPinsFromMap` operation has the following properties:

OPERATION
<b><i>removeAllPinsFromMap</i></b>
used to remove all pins on the map (usually used to afterwards regenerate new pins, so that the map stays clean).
<b><i>Return type</i></b>
<code>ptBoolean</code>
<b><i>Post-Condition (functional)</i></b>
PostF 1 All pins are removed from the map.

## 5.11 Secondary Types - Operation Schemes for Enumerations

There are no elements in this category in the system analysed.



## Chapter 6

### Test Model(s)

There are no elements in this category in the system analysed.



## Chapter 7

# Additional Constraints



# Appendix A

## Undocumented Messir Specification Elements

### A.1 Undocumented Use Cases

#### A.1.1 Undocumented Subfunction Level Use Cases

- lu.uni.lassy.excalibur.group09.spec.usecases.oeAddRequestHelp
- lu.uni.lassy.excalibur.group09.spec.usecases.oeCloseCrisisEvent
- lu.uni.lassy.excalibur.group09.spec.usecases.oeCreateNewCrisisEvent
- lu.uni.lassy.excalibur.group09.spec.usecases.oeGetCrisisEventInformation
- lu.uni.lassy.excalibur.group09.spec.usecases.oeAddNewCrisisEvent
- lu.uni.lassy.excalibur.group09.spec.usecases.oeMessage
- lu.uni.lassy.excalibur.group09.spec.usecases.oeMovePinOnMap
- lu.uni.lassy.excalibur.group09.spec.usecases.oeRefreshMap
- lu.uni.lassy.excalibur.group09.spec.usecases.oeRequestCrisisEventLocation
- lu.uni.lassy.excalibur.group09.spec.usecases.oeRequestHelp
- lu.uni.lassy.excalibur.group09.spec.usecases.oeReceiveCrisisEventLocation
- lu.uni.lassy.excalibur.group09.spec.usecases.oeUpdateDispatchStatus



## Appendix B

# Messir Specification Files Listing

### B.1 File ./src-gen/messir-spec/.views.msr

```
1 //  
2 //DON'T TOUCH THIS FILE !!!  
3 //  
4 package uidff8a216549a64951bf055c8b5a9dde2a {  
5   Concept Model {}  
6 }
```

Listing B.1: Messir Spec. file .views.msr.

### B.2 File ./src-gen/messir-spec/operations/environment/environment-actAbstractDispatchCoordinator-oeCloseCrisisEvent.msr

```
1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actAbstractDispatchCoordinator.  
    outactAbstractDispatchCoordinator.oeCloseCrisisEvent {  
2  
3   import lu.uni.lassy.messir.libraries.primitives  
4   import lu.uni.lassy.messir.libraries.math  
5   import lu.uni.lassy.messir.libraries.string  
6   import lu.uni.lassy.messir.libraries.calendar  
7   import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes  
8   import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes  
9  
10  Operation Model {  
11  
12    operation: lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator.  
        outactAbstractDispatchCoordinator.oeCloseCrisisEvent():ptBoolean{  
13      // include below the specification information (pre,post or ocl or prolog)  
14  
15    }  
16  }  
17 }
```

Listing B.2: Messir Spec. file environment-actAbstractDispatchCoordinator-oeCloseCrisisEvent.msr.

### B.3 File ./src-gen/messir-spec/operations/environment/environment-actAbstractDispatchCoordinator-oeGetCrisisEventInformation.msr

```
1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actAbstractDispatchCoordinator.  
    outactAbstractDispatchCoordinator.oeGetCrisisEventInformation {  
2  
3   import lu.uni.lassy.messir.libraries.primitives  
4   import lu.uni.lassy.messir.libraries.math  
5   import lu.uni.lassy.messir.libraries.string  
6   import lu.uni.lassy.messir.libraries.calendar
```

```

7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12   operation: lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator.
      outactAbstractDispatchCoordinator.oeGetCrisisEventInformation(AdtGeoPos:dtGeoPos):ptBoolean{
13     // include below the specification information (pre,post or ocl or prolog)
14
15   }
16 }
17 }
```

Listing B.3: Messir Spec. file environment-actAbstractDispatchCoordinator-oeGetCrisisEventInformation.msr.

## B.4 File ./src-gen/messir-spec/operations/environment/environment-actAbstractDispatchCoordinator-oeMessage.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actAbstractDispatchCoordinator.
  outactAbstractDispatchCoordinator.oeMessage {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12   operation: lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator.
      outactAbstractDispatchCoordinator.oeMessage(AdtComment:dtComment):ptBoolean{
13     // include below the specification information (pre,post or ocl or prolog)
14
15   }
16 }
17 }
```

Listing B.4: Messir Spec. file environment-actAbstractDispatchCoordinator-oeMessage.msr.

## B.5 File ./src-gen/messir-spec/operations/environment/environment-actAbstractDispatchCoordinator-oeRefreshMap.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actAbstractDispatchCoordinator.
  outactAbstractDispatchCoordinator.oeRefreshMap {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12   operation: lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator.
      outactAbstractDispatchCoordinator.oeRefreshMap(AdtGeoPos:dtGeoPos):ptBoolean{
13     // include below the specification information (pre,post or ocl or prolog)
14
15   }
16 }
17 }
```

Listing B.5: Messir Spec. file environment-actAbstractDispatchCoordinator-oeRefreshMap.msr.

## B.6 File ./src-gen/messir-spec/operations/environment/environment-actAbstractDispatchCoordinator-oeUpdateDispatchStatus.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actAbstractDispatchCoordinator.
    outactAbstractDispatchCoordinator.oeUpdateDispatchStatus {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12     operation: lu.uni.lassy.excalibur.group09.spec.environment.actAbstractDispatchCoordinator.
        outactAbstractDispatchCoordinator.oeUpdateDispatchStatus(AetDispatchStatus:etDispatchStatus):
            ptBoolean{
13         // include below the specification information (pre,post or ocl or prolog)
14
15     }
16 }
17 }
```

Listing B.6: Messir Spec. file environment-actAbstractDispatchCoordinator-oeUpdateDispatchStatus.msr.

## B.7 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeAddNewCrisisEvent.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
    outactCentralCoordinator.oeAddNewCrisisEvent {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7
8 Operation Model {
9
10     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
        outactCentralCoordinator.oeAddNewCrisisEvent():ptBoolean{
11         // include below the specification information (pre,post or ocl or prolog)
12
13     }
14 }
15 }
```

Listing B.7: Messir Spec. file environment-actCentralCoordinator-oeAddNewCrisisEvent.msr.

## B.8 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeConfirmCrisisEventLocation.msr

```

1 //package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
    outactCentralCoordinator.oeConfirmCrisisEventLocation {
2 //
3 //import lu.uni.lassy.messir.libraries.primitives
4 //import lu.uni.lassy.messir.libraries.math
5 //import lu.uni.lassy.messir.libraries.string
6 //import lu.uni.lassy.messir.libraries.calendar
7 //
8 // Operation Model {
9 //
10 //     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
        outactCentralCoordinator.oeConfirmCrisisEventLocation():ptBoolean{
```

```

11 //  // include below the specification information (pre,post or ocl or prolog)
12 //
13 //  )
14 //  )
15 //}

```

Listing B.8: Messir Spec. file environment-actCentralCoordinator-oeConfirmCrisisEventLocation.msr.

## B.9 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeCreateNewCrisisEvent.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
    outactCentralCoordinator.oeCreateNewCrisisEvent {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.classes
10 import lu.uni.lassy.excalibur.group09.spec.environment
11
12 Operation Model {
13
14     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
        outactCentralCoordinator.oeCreateNewCrisisEvent(
15         AName:dtString,
16         AetHumanType:etHumanType,
17         AdtPhoneNumber:dtPhoneNumber,
18         AdtMapWithPin:dtMapWithPin,
19         AdtComment:dtComment
20     ):ptBoolean{
21         // include below the specification information (pre,post or ocl or prolog)
22         prep{
23             let AetCentralCoordinatorMode:etCentralCoordinatorMode in
24
25             //PreP 01
26             self.rnActor.mode@pre = AetCentralCoordinatorMode
27             and 'isInAddEvent' = AetCentralCoordinatorMode
28
29         }
30
31         postF{
32             let TheCrisisEvent:ctCrisisEvent in
33             let TheMessage:dtString in
34
35             let AdtGeoPosOfCrisisEvent:dtGeoPos in
36             let AdtCrisisID:dtCrisisID in
37
38             let TheFiremenCoordinator:ctDispatchedCoordinator in
39             let TheTowServiceCoordinator:ctDispatchedCoordinator in
40             let TheFiremenCoordinatorIN:actAbstractDispatchCoordinator in
41             let TheTowServiceCoordinatorIN:actAbstractDispatchCoordinator in
42
43             let AetFiremenMode:etFiremenMode in
44             let AFirstTeamType:etTeamType in
45             let ASecondTeamType:etTeamType in
46
47             let TheHuman:ctHuman in
48
49             //PostF 01
50             self.rnActor.rnSystem.nextValueForAlertID@pre = AdtCrisisID
51             and self.rnActor.rnctMapWithPin.mapWithPin.getPinGeoPos() = AdtGeoPosOfCrisisEvent
52             and TheCrisisEvent.init(
53                 AdtCrisisID,
54                 AdtGeoPosOfCrisisEvent
55             )

```

## B.9. FILE /SRC-GEN.../ENVIRONMENT-ACTCENTRALCOORDINATOR-OECREATENEWCRISISEVENT.MSL

```
56
57 //PostF 02
58 and TheFiremenCoordinator.type@pre = AFirstTeamType
59 and 'Firemen' = AFirstTeamType
60 and TheTowServiceCoordinator.type@pre = ASecondTeamType
61 and 'TowService' = ASecondTeamType
62 and 'TRUE' = TheFiremenCoordinator.isFree@pre
63 and 'TRUE' = TheTowService.isFree@pre
64
65 /*
66 ctDispatchCoordinator such that there doesn't exist another ctDispatchCoordinator that has a
67 shorter distance
68 between its geographical position and the geographical position of the newly instanciated crisis
69 event.
70 */
71 and TheFiremenCoordinator = self.rnActor.rnSystem.rnctDispatchedCoordinator->select(
72     dc1 / dtMapWithPin.distance(dc1.geoPos, AdtGeoPosOfCrisisEvent) > distance(self.rnActor.
73         rnSystem.rnctDispatchedCoordinator.geoPos, AdtGeoPosOfCrisisEvent)->isEmpty()
74 )
75
76 and TheTowServiceCoordinator = self.rnActor.rnSystem.rnctDispatchedCoordinator->select(
77     dc1 / dtMapWithPin.distance(dc1.geoPos, AdtGeoPosOfCrisisEvent) > distance(self.rnActor.
78         rnSystem.rnctDispatchedCoordinator.geoPos, AdtGeoPosOfCrisisEvent)->isEmpty()
79 )
80 and 'InStation' = TheFiremen.status@post
81 and 'InStation' = TheFiremen.status@post
82 and 'You have received a new dispatch order!' = TheMessage.value
83 and TheFiremenIN^ieReceiveNewCrisisEvent(AdtCrisisID, 'You have received a new dispatch order!')
84 and TheTowServiceIN^ieReceiveNewCrisisEvent(AdtCrisisID, 'You have received a new dispatch order
85 !
86
87 //PostF 03
88 and TheCrisisEvent.rnactCentralCoordinator = self.rnActor@pre
89
90 and TheCrisisEvent.rnctDispatchedCoordinator = TheFiremenCoordinator
91 and TheCrisisEvent.rnctDispatchedCoordinator = TheTowServiceCoordinator
92
93 and TheCrisisEvent.rnctMapWithPin = self.rnActor.rnctMapWithPin@post
94
95 //IF an ctHuman instance with the same id (PhoneNumber) is already in the system state, associate
96 //it to that instance
97 //ELSE initialise a new ctHuman instance and associate it
98 and if(
99     self.rnActor.rnSystem.rnHuman -> exists(h / h.id = AdtPhoneNumber)
100 )
101 then(
102     TheHuman = self.rnActor.rnSystem.rnHuman -> select(h / h.id = AdtPhoneNumber)
103     TheCrisisEvent.rnHuman = TheHuman
104 )
105 else(
106     TheHuman.init(
107         AdtPhoneNumber,
108         AName,
109         AetHumanType
110     )
111     TheCrisisEvent.rnHuman = TheHuman
112 )
113 endif
114
115 and TheCrisisEvent.rnctComment = self.rnActor.rnctComment@post
116
117 //PostF 04
118 and 'FALSE' = TheFiremenCoordinator.isFree@post
119 and 'FALSE' = TheTowServiceCoordinator.isFree@post
120
121 //PostF 05
122 and self.rnActor.rnSystem.nextValueForAlertID@post = self.rnActor.rnSystem.
123     nextValueForAlertID@pre + 1
```

```

119
120  }
121
122  postP{
123    let TheCrisisEvent:ctCrisisEvent in
124
125    let AetCentralCoordinatorMode:etCentralCoordinatorMode in
126    let AetDispatchCoordinatorMode:etDispatchCoordinatorMode in
127
128    let AFirstTeamType:etTeamType in
129    let ASecondTeamType:etTeamType in
130
131    let TheFiremenCoordinator:ctDispatchedCoordinator in
132    let TheTowServiceCoordinator:ctDispatchedCoordinator in
133
134    let AetFiremenMode:etFiremenMode in
135
136    //PostP_01
137    and self.rnActor.mode@post = AetCentralCoordinatorMode
138    and 'isInMain' = AetCentralCoordinatorMode
139
140    /*PostP_02 & 03*/
141    and self.rnActor.rnctCrisisEvent = TheCrisisEvent
142
143    //To make sure who is who
144    and TheFiremenCoordinator.type@pre = AFirstTeamType
145    and 'Firemen' = AFirstTeamType
146    and TheTowServiceCoordinator.type@pre = ASecondTeamType
147    and 'TowService' = ASecondTeamType
148
149    and TheCrisisEvent.rnctDispatchedCoordinator = TheFiremenCoordinator
150    and TheCrisisEvent.rnctDispatchedCoordinator = TheTowServiceCoordinator
151
152    //PostP_02
153    and TheFiremenCoordinator.mode@post = AetDispatchCoordinatorMode
154    and TheTowServiceCoordinator.mode@post = AetDispatchCoordinatorMode
155    and 'hasBeenAssociatedToACrisisEvent' = AetDispatchCoordinatorMode
156
157    //PostP_03
158    and TheFirementCoordinator.modeFM@post = AetFiremenMode
159    and 'IsNotInRequestHelp' = AetFiremenMode
160  }
161
162 }
163 }
164 }
```

Listing B.9: Messir Spec. file environment-actCentralCoordinator-oeCreateNewCrisisEvent.msr.

## B.10 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeInitialiseNewCrisisEvent.msr

```

1 //package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
2   outactCentralCoordinator.oeInitialiseNewCrisisEvent {
3 /**
4 //import lu.uni.lassy.messir.libraries.primitives
5 //import lu.uni.lassy.messir.libraries.math
6 //import lu.uni.lassy.messir.libraries.string
7 //import lu.uni.lassy.messir.libraries.calendar
8 /**
9 // Operation Model {
10 //   operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
11 //             outactCentralCoordinator.oeInitialiseNewCrisisEvent():ptBoolean(
12 //               // include below the specification information (pre,post or ocl or prolog)
13 //             )
14 // }
```

15 //

Listing B.10: Messir Spec. file environment-actCentralCoordinator-oeInitialiseNewCrisisEvent.msr.

## B.11 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeMovePinOnMap.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
    outactCentralCoordinator.oeMovePinOnMap {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
8
9 Operation Model {
10
11     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
        outactCentralCoordinator.oeMovePinOnMap(AdtGeoPos:dtGeoPos):ptBoolean{
12         // include below the specification information (pre,post or ocl or prolog)
13
14     }
15 }
16 }
```

Listing B.11: Messir Spec. file environment-actCentralCoordinator-oeMovePinOnMap.msr.

## B.12 File ./src-gen/messir-spec/operations/environment/environment-actCentralCoordinator-oeRequestCrisisEventLocation.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCentralCoordinator.
    outactCentralCoordinator.oeRequestCrisisEventLocation {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
9
10 Operation Model {
11
12     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator.
        outactCentralCoordinator.oeRequestCrisisEventLocation(AdtPhoneNumber:dtPhoneNumber):ptBoolean{
13         // include below the specification information (pre,post or ocl or prolog)
14     prep {
15         let AvpStarted: ptBoolean in
16             self.rnActor.rnSystem.vpStarted = AvpStarted
17             and AvpStarted = true
18     }
19
20     preF { true }
21
22     postF {
23         let TheactYou:lu.uni.lassy.excalibur.group09.spec.environment.actCentralCoordinator in
24         let AptString:ptString in
25             /* Post Functional:*/
26             /* PostF01 */
27             AptString = 'Hello World !'
28             and TheactYou.InterfaceIN = self.rnActor.InterfaceIN
29             and TheactYou.InterfaceIN^ieHelloWorld(AptString)
30     }
31
32     postP { true }
33 }
```

34 }				
35 }				
Listing	B.12:	Messir	Spec.	file
environment-actCentralCoordinator-oeRequestCrisisEventLocation.msr.				

### B.13 File ./src-gen/messir-spec/operations/environment/environment-actCommunicationCompany-oeReceiveCrisisEventLocation.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actCommunicationCompany.
    outactCommunicationCompany.oeReceiveCrisisEventLocation {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12     operation: lu.uni.lassy.excalibur.group09.spec.environment.actCommunicationCompany.
        outactCommunicationCompany.oeReceiveCrisisEventLocation(AdtGeoPos:dtGeoPos):ptBoolean{
13         // include below the specification information (pre,post or ocl or prolog)
14
15     }
16 }
17 }
```

Listing	B.13:	Messir	Spec.	file
environment-actCommunicationCompany-oeReceiveCrisisEventLocation.msr.				

### B.14 File ./src-gen/messir-spec/operations/environment/environment-actFiremenCoordinator-oeAddRequestHelp.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actFiremenCoordinator.
    outactFiremenCoordinator.oeAddRequestHelp {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7
8 Operation Model {
9
10     operation: lu.uni.lassy.excalibur.group09.spec.environment.actFiremenCoordinator.
        outactFiremenCoordinator.oeAddRequestHelp():ptBoolean{
11         // include below the specification information (pre,post or ocl or prolog)
12
13     }
14 }
15 }
```

Listing B.14: Messir Spec. file environment-actFiremenCoordinator-oeAddRequestHelp.msr.

### B.15 File ./src-gen/messir-spec/operations/environment/environment-actFiremenCoordinator-oeRequestHelp.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.environment.operations.actFiremenCoordinator.
    outactFiremenCoordinator.oeRequestHelp {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
```

```

5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
9
10 Operation Model {
11
12   operation: lu.uni.lassy.excalibur.group09.spec.environment.actFiremenCoordinator.
13     outactFiremenCoordinator.oeRequestHelp(AetTeamType:etTeamType, ARequestedNumber:ptInteger) :
14       ptBoolean{
15   }
16 }
17 }
```

Listing B.15: Messir Spec. file environment-actFiremenCoordinator-oeRequestHelp.msr.

## B.16 File ./src-gen/messir-spec/environment/environment.msr

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.environment {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
13 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
14
15 Environment Model {
16
17   actor actCentralCoordinator role rnactCentralCoordinator cardinality [1...*] {
18
19     attribute mode: etCentralCoordinatorMode
20     operation init():ptBoolean
21
22     input interface inactCentralCoordinator {
23       operation ieReceiveCrisisEventLocation(AdtMapWithPin:dtMapWithPin) : ptBoolean
24       operation ieMessageCentralCoordinator(AdtComment:dtComment) : ptBoolean
25     }
26
27     output interface outactCentralCoordinator {
28       operation oeAddNewCrisisEvent() : ptBoolean
29       operation oeRequestCrisisEventLocation(AdtPhoneNumber:dtPhoneNumber) : ptBoolean
30       operation oeCreateNewCrisisEvent(AName:dtString, AetHumanType:etHumanType, AdtPhoneNumber:
31         dtPhoneNumber, AdtMapWithPin:dtMapWithPin, AdtComment:dtComment) : ptBoolean
32       operation oeMovePinOnMap (AdtGeoPos:dtGeoPos) : ptBoolean
33     }
34   }
35
36   actor actCommunicationCompany role rnactCommunicationCompany cardinality [1...*] {
37
38     attribute mode: etComCompanyMode
39     operation init() : ptBoolean
40
41     input interface inactCommunicationCompany {
42       operation ieRequestCrisisEventLocation(AdtPhoneNumber:dtPhoneNumber) : ptBoolean
43     }
44
45     output interface outactCommunicationCompany {
46       operation oeReceiveCrisisEventLocation(AdtGeoPos:dtGeoPos) : ptBoolean
47     }
48 }
```

```

49 actor actAbstractDispatchCoordinator role rnactAbstractDispatchCoordinator cardinality [1..*] {
50
51   operation init() : ptBoolean
52
53   input interface inactAbstractDispatchCoordinator {
54     operation ieReceiveNewCrisisEvent(AdtCrisisID:dtCrisisID, AMesssage:dtString) : ptBoolean
55     operation ieReceiveCrisisEventInformation(AdtName:ptString, AetHumanType:etHumanType,
56       AdtPhoneNumber:dtPhoneNumber, AdtMapWithPin:dtMapWithPin, AdtComment:dtComment) : ptBoolean
57     operation ieMessageAbstractDispatchCoordinator(AdtComment: dtComment) : ptBoolean
58     operation ieReceiveMap(AdtMapWithPin: dtMapWithPin) : ptBoolean
59   }
60
61   output interface outactAbstractDispatchCoordinator {
62     operation oeGetCrisisEventInformation(AdtGeoPos:dtGeoPos) : ptBoolean
63     operation oeMessage(AdtComment:dtComment) : ptBoolean
64     operation oeUpdateDispatchStatus(AetDispatchStatus:etDispatchStatus): ptBoolean
65     operation oeRefreshMap(AdtGeoPos:dtGeoPos) : ptBoolean
66     operation oeCloseCrisisEvent(): ptBoolean
67   }
68
69   actor actFiremenCoordinator role rnactFiremenCoordinator cardinality [1..*] extends
70     actAbstractDispatchCoordinator {
71
72     operation init() : ptBoolean
73
74     input interface inactFiremenCoordinator {
75   }
76
77     output interface outactFiremenCoordinator {
78       operation oeAddRequestHelp() : ptBoolean
79       operation oeRequestHelp(AetTeamType: etTeamType, ARRequestedNumber:ptInteger) : ptBoolean
80     }
81
82   actor actPoliceCoordinator role rnPoliceCoordinator cardinality [1..*] extends
83     actAbstractDispatchCoordinator {
84
85     attribute modeFM: etFiremenMode
86     operation init() : ptBoolean
87
88     input interface inactPoliceCoordinator {
89   }
90
91     output interface outactPoliceCoordinator {
92   }
93
94   actor actTowServiceCoordinator role rnTowServiceCoordinator cardinality [1..*] extends
95     actAbstractDispatchCoordinator {
96
97     operation init() : ptBoolean
98
99     input interface inactTowServiceCoordinator {
100
101    output interface outactTowServiceCoordinator {
102  }
103}
104
105}
106}

```

Listing B.16: Messir Spec. file environment.msr.

**B.17 File**

./src-gen/messir-spec/concepts/primarytypes-  
associations/primarytypes-associations.msr

```

2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.associations {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.classes
13 import lu.uni.lassy.excalibur.group09.spec.environment
14
15 Concept Model {
16
17 Primary Types {
18
19   association assctCrisisEventctHuman
20     ctCrisisEvent(rnctCrisisEvent) [1..1]
21     ctHuman(rnctHuman) [1..*]
22
23   association assctCrisisEventctMapWithPin
24     ctCrisisEvent(rnctCrisisEvent) [1..1]
25     ctMapWithPin(rnctMapWithPin) [1..1]
26
27   association assDispatchedCoordinatorctMapWithPin
28     ctDispatchedCoordinator(rnctDispatchedCoordinator) [1..1]
29     ctMapWithPin(rnctMapWithPin) [1..1]
30
31   association assactComCompanyctMapWithPin
32     actCommunicationCompany(rnactCommunicationCompany) [1..1]
33     ctMapWithPin(rnctMapWithPin) [1..*]
34
35   association assactCentralCoordinatorctMapWithPin
36     actCentralCoordinator(rnactCentralCoordinator) [1..1]
37     ctMapWithPin(rnctMapWithPin) [1..*]
38
39   association assClassActorDispatchCoordinator
40     ctDispatchedCoordinator(rnctDispatchedCoordinator) [1..1]
41     actAbstractDispatchCoordinator(rnactAbstractDispatchCoordinator) [1..1]
42
43   association assctDispatchedCoordinatorctCrisisEvent
44     ctDispatchedCoordinator(rnctDispatchedCoordinator) [2..*]
45     ctCrisisEvent(rnctCrisisEvent) [1..1]
46
47   association assctCommentctCrisisEvent
48     ctComment(rnctComment) [0..*]
49     ctCrisisEvent(rnctCrisisEvent) [1..1]
50
51   association assctCommentctDispatchedCoordinator
52     ctComment(rnctComment) [0..*]
53     ctDispatchedCoordinator(rnctDispatchedCoordinator) [1..1]
54
55   association assctCommentactCentralCoordinator
56     ctComment(rnctComment) [0..*]
57     actCentralCoordinator(rnactCentralCoordinator) [1..1]
58
59   association assctCrisisEventactCentralCoordinator
60     ctCrisisEvent(ctCrisisEvent) [0..*]
61     actCentralCoordinator(rnactCentralCoordinator) [1..1]
62 }
63 }
64 }
```

Listing B.17: Messir Spec. file primarytypes-associations.msr.

## B.18 File ./src-gen/messir-spec/concepts/primarytypes-classes/primarytypes-classes.msr

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.classes {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
13 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
14
15 import lu.uni.lassy.messir.libraries.primitives
16
17 Concept Model {
18
19 Primary Types {
20
21 state class ctState {
22 attribute vpStarted: ptBoolean
23 attribute nextValueForAlertID:ptInteger
24 operation init( ANextValueForAlertID:ptInteger,
25 AvpStarted:ptBoolean
26 ): ptBoolean
27 }
28
29 class ctHuman role rnHuman cardinality [1..*] {
30 attribute id: dtPhoneNumber
31 attribute name: dtString
32 attribute type: etHumanType
33
34 operation init( Aid:dtPhoneNumber,
35 Aname:dtString,
36 Atype:etHumanType
37 ): ptBoolean
38 }
39
40
41 class ctCrisisEvent role rnCrisisEvent cardinality [1..*] {
42 attribute id: dtCrisisID
43 attribute geoPos: dtGeoPos
44
45 operation init( Aid:dtCrisisID,
46 AgeoPos:dtGeoPos
47 ): ptBoolean
48 }
49
50 class ctComment role rnComment cardinality [0..*] {
51 attribute comment: dtComment
52
53 operation init( AComment: dtComment
54
55 ): ptBoolean
56 }
57
58 class ctDispatchedCoordinator role rnDispatchedCoordinator cardinality [1..*] {
59 attribute type: etTeamType
60 attribute status: etDispatchStatus
61 attribute geoPos: dtGeoPos
62 attribute isFree: ptBoolean
63 attribute mode: etDispatchCoordinatorMode
64
65 operation init( Atype:etTeamType,
66 Astatus:etDispatchStatus,
67 AgeoPos:dtGeoPos,
68 AisFree:ptBoolean,
69 Amode:etDispatchCoordinatorMode
70 ): ptBoolean

```

```

71 }
72
73 class ctMapWithPin role rnMapWithPin cardinality [1..*] {
74   attribute mapWithPin: dtMapWithPin
75
76   operation init( AmapWithPin:dtMapWithPin
77 ) : ptBoolean
78
79 }
80
81 }
82 }
83 }
```

Listing B.18: Messir Spec. file primarytypes-classes.msr.

## B.19 File [./src-gen/messir-spec/concepts/primarytypes-datatypes/primarytypes-datatypes.msr](#)

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
13
14 Concept Model {
15
16 Primary Types {
17
18   datatype dtGeoPos {
19     attribute latitude:dtLatitude
20     attribute longitude:dtLongitude
21     operation is():ptBoolean
22   }
23
24   enum etDispatchStatus {
25     constants["InStation", "InTransit", "Arrived"]
26     operation is():ptBoolean
27   }
28
29   enum etHumanType {
30     constants["Victim", "Witness"]
31     operation is():ptBoolean
32   }
33
34   enum etTeamType {
35     constants["Firemen", "Police", "TowService"]
36     operation is():ptBoolean
37   }
38
39   enum etCentralCoordinatorMode {
40     constants["isInMain", "isInAddEvent"]
41     operation is():ptBoolean
42   }
43
44   enum etDispatchCoordinatorMode {
45     constants["hasBeenAssociatedToACrisisEvent", "isInStandBy", "isInMain", "
46       isInMainWithCloseEventUnlocked", "isNull"]
47     operation is():ptBoolean
48   }
}
```

```

49     enum etFiremenMode {
50
51         constants["isInRequestHelp", "isNotInRequestHelp"]
52         operation is():ptBoolean
53
54     }
55
56     enum etComCompanyMode {
57         constants["isInRequest", "isInStandBy"]
58         operation is():ptBoolean
59     }
60
61 }
62 }
63 }
```

Listing B.19: Messir Spec. file primarytypes-datatypes.msr.

## B.20 File [./src-gen/messir-spec/concepts/secondarytypes-associations/secondarytypes-associations.msr](#)

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.associations {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12
13 Concept Model {
14
15     Secondary Types {
16
17     }
18 }
19 }
```

Listing B.20: Messir Spec. file secondarytypes-associations.msr.

## B.21 File [./src-gen/messir-spec/concepts/secondarytypes-classes/secondarytypes-classes.msr](#)

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.classes {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12
13 Concept Model {
14
15     Secondary Types {
16
17     }
18 }
19 }
```

Listing B.21: Messir Spec. file secondarytypes-classes.msr.

## B.22 File ./src-gen/messir-spec/operations/concepts/secondarytypes-datatatypes/secondarytypes-datatatypes-dtMapWithPin-addPinToMap.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.operations.datatypes.
    dtMapWithPin.addPinToMap {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
9
10 Operation Model {
11
12     operation: lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.dtMapWithPin.
        addPinToMap(AGeoPos:dtGeoPos):ptBoolean{
13         // include below the specification information (pre,post or ocl or prolog)
14
15     }
16 }
17 }
```

Listing B.22: Messir Spec. file secondarytypes-datatatypes-dtMapWithPin-addPinToMap.msr.

## B.23 File ./src-gen/messir-spec/operations/concepts/secondarytypes-datatypes/secondarytypes-datatatypes-dtMapWithPin-getPinGeoPos.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.operations.datatypes.
    dtMapWithPin.getPinGeoPos {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
9
10 Operation Model {
11
12     operation: lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.dtMapWithPin.
        getPinGeoPos():dtGeoPos{
13         // include below the specification information (pre,post or ocl or prolog)
14
15     }
16 }
17 }
```

Listing B.23: Messir Spec. file secondarytypes-datatatypes-dtMapWithPin-getPinGeoPos.msr.

## B.24 File ./src-gen/messir-spec/operations/concepts/secondarytypes-datatypes/secondarytypes-datatatypes-dtMapWithPin-removeAllPinsFromMap.msr

```

1 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.operations.datatypes.
    dtMapWithPin.removeAllPinsFromMap {
2
3 import lu.uni.lassy.messir.libraries.primitives
4 import lu.uni.lassy.messir.libraries.math
5 import lu.uni.lassy.messir.libraries.string
```

```

6 import lu.uni.lassy.messir.libraries.calendar
7 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
8 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
9
10 Operation Model {
11
12   operation: lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes.dtMapWithPin.
13     removeAllPinsFromMap():ptBoolean{
14   // include below the specification information (pre,post or ocl or prolog)
15 }
16 }
17 }
```

Listing B.24: Messir Spec. file  
secondarytypes-datatypes-dtMapWithPin-removeAllPinsFromMap.msr.

## B.25 File ./src-gen/messir-spec/concepts/secondarytypes-datatypes/secondarytypes-datatypes.msr

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
13
14 Concept Model {
15
16 Secondary Types {
17
18   datatype dtPhoneNumber extends dtString {
19     operation is() : ptBoolean
20   }
21
22   datatype dtAddress extends dtString {
23     operation is() : ptBoolean
24   }
25
26   datatype dtCrisisID extends dtInteger {
27     operation is() : ptBoolean
28   }
29
30   datatype dtLongitude extends dtReal {
31     operation is() : ptBoolean
32   }
33
34   datatype dtLatitude extends dtReal {
35     operation is() : ptBoolean
36   }
37
38   datatype dtImage extends dtString {
39     operation is() : ptBoolean
40   }
41
42   datatype dtMapWithPin extends dtImage {
43     operation getPinGeoPos() : dtGeoPos
44     operation removeAllPinsFromMap() : ptBoolean
45     operation addPinToMap(AGeoPos:dtGeoPos) : ptBoolean
46     operation distance(AGeoPosOne:dtGeoPos, AGeoPosTwo:dtGeoPos) : dtInteger
47     operation is() : ptBoolean
48 }
```

```

49
50  datatype dtComment extends dtString {
51      operation is() : ptBoolean
52  }
53 }
54
55 }
56 }
```

Listing B.25: Messir Spec. file secondarytypes-datatatypes.msr.

**B.26 File ./src-gen/messir-spec/tests/tests.msr**

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.tests {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12
13 Test Model {
14
15 }
16
17 }
```

Listing B.26: Messir Spec. file tests.msr.

**B.27 File ./src-gen/messir-spec/usecases/usecaseinstance-ugCreateNewCrisisEvent-uciugCreateNewCrisisEvent.msr**

```

1 package usecases.uciugCreateNewCrisisEvent {
2     import lu.uni.lassy.excalibur.group09.spec.usecases
3     import lu.uni.lassy.excalibur.group09.spec.usecases
4     import lu.uni.lassy.excalibur.group09.spec.environment
5     import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
6
7     Use Case Model {
8         use case instance uciugCreateNewCrisisEvent : ugCreateNewCrisisEvent {
9             actors {
10                 Camille : actCentralCoordinator
11                 Orange : actCommunicationCompany
12                 Fabio : actFiremenCoordinator
13                 Ted : actTowServiceCoordinator
14             }
15
16             use case steps {
17                 Camille executed instanceof subfunction oeAddNewCrisisEvent() {
18                     }
19
20                 Camille executed instanceof subfunction oeRequestCrisisEventLocation("AdtPhoneNumber=691 12 34
21                     56") {
22                     ieRequestCrisisEventLocation("691 12 34 56") returned to Orange
23                 }
24
25                 Orange executed instanceof subfunction oeReceiveCrisisEventLocation("Latitude=87.20, Longitude
26                     =20.25") {
27                     ieReceiveCrisisEventLocation("A string for the image with the pin") returned to Camille
28                 }
29
30                 Camille executed instanceof subfunction oeMovePinOnMap("Latitude=75.08, Longitude=23.03") {
31                     ieReceiveCrisisEventLocation("A string for the image with the pin") returned to Camille
32                 }
33             }
34         }
35     }
36 }
```

```

30     }
31
32 Camille executed instanceof subfunction oeCreateNewCrisisEvent("AdtName=Walter", "AenHumanType=
33             Witness", "AdtPhoneNumber=691123456", "A string for the image with the pins", "The Witness
34             can't stay at the accident's location for long.") {
35     ieReceiveNewCrisisEvent("1","You have received a new Crisis Event Dispatch Order!") returned to
36             Fabio
37     ieReceiveNewCrisisEvent("1","You have received a new Crisis Event Dispatch Order!") returned to
38             Ted
39 }
40 }
41 }
```

Listing            B.27:                Messir                Spec.                file  
usecaseinstance-ugCreateNewCrisisEvent-uciugCreateNewCrisisEvent.msr.

## B.28 File                ./src-gen/messir-spec/usecases/usecaseinstance- ugGlobalDispatchManagement-uciugGlobalDispatchManagement.msr

```

1 package usecases.uciugGlobalDispatchManagement {
2   import lu.uni.lassy.excalibur.group09.spec.usecases
3   import lu.uni.lassy.excalibur.group09.spec.usecases
4   import lu.uni.lassy.excalibur.group09.spec.environment
5   import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
6
7   Use Case Model {
8     use case instance uciugGlobalDispatchManagement : ugGlobalDispatchManagement {
9       actors {
10         Camille : actCentralCoordinator
11         Fabio : actFiremenCoordinator
12         Ted : actTowServiceCoordinator
13         Polo : actPoliceCoordinator
14     }
15     use case steps {
16       Fabio executed instanceof subfunction oeGetCrisisEventInformation() {
17         ieReceiveCrisisEventInformation("1","Walter","Witness","691123456","A string for the image
18             with the pins","The Witness can't stay at the accident's location for long.") returned to
19             Fabio
20     }
21     Fabio executed instanceof subfunction oeUpdateDispatchStatus("AenDispatchStatus=InTransit") {
22       ieMessageAbstractDispatchCoordinator("Dispatch Status Updated.") returned to Fabio
23     }
24     Ted executed instanceof subfunction oeGetCrisisEventInformation() {
25       ieReceiveCrisisEventInformation("1","Walter","Witness","691123456","A string for the image
26             with the pins","The Witness can't stay at the accident's location for long.") returned to
27             Ted
28     }
29     Ted executed instanceof subfunction oeRefreshMap("Latitude=80.57, Longitude=50.23") {
30       ieReceiveMap("A string for the image with the pins") returned to Ted
31     }
32     Ted executed instanceof subfunction oeMessage("AdtComment=I will arrive in 30 minutes") {
33       ieMessageCentralCoordinator("I will arrive in 30 minutes") returned to Camille
34       ieMessageAbstractDispatchCoordinator("I will arrive in 30 minutes") returned to Fabio
35       ieMessageAbstractDispatchCoordinator("I will arrive in 30 minutes") returned to Ted
36     }
37     Ted executed instanceof subfunction oeUpdateDispatchStatus("AenDispatchStatus=InTransit") {
38       ieMessageAbstractDispatchCoordinator("Dispatch Status Updated.") returned to Ted
39     }
40 }
```

```

42  Fabio executed instanceof subfunction oeUpdateDispatchStatus("AenDispatchStatus=Arrived") {
43      ieMessageAbstractDispatchCoordinator("Dispatch Status Updated.") returned to Fabio
44  }
45
46  Fabio executed instanceof subfunction oeAddRequestHelp() {
47  }
48
49
50  Fabio executed instanceof subfunction oeRequestHelp("AenTeamType=Police", "RequestedNumber=1")
51      {
52          ieReceiveNewCrisisEvent("1","You have received a new Crisis Event Dispatch Order!") returned
53              to Polo
54  }
55
56  Polo executed instanceof subfunction oeGetCrisisEventInformation() {
57      ieReceiveCrisisEventInformation("1","Walter","Witness","691123456","A string for the image
58          with the pins","The Witness can't stay at the accident's location for long.") returned to
59              Polo
60  }
61
62  Ted executed instanceof subfunction oeUpdateDispatchStatus("AenDispatchStatus=Arrived") {
63      ieMessageAbstractDispatchCoordinator("Dispatch Status Updated.") returned to Ted
64  }
65
66  Polo executed instanceof subfunction oeUpdateDispatchStatus("AenDispatchStatus=Arrived") {
67      ieMessageAbstractDispatchCoordinator("Dispatch Status Updated.") returned to Polo
68  }
69
70  Fabio executed instanceof subfunction oeCloseCrisisEvent() {
71  }
72
73  Ted executed instanceof subfunction oeCloseCrisisEvent() {
74  }
75
76  Polo executed instanceof subfunction oeCloseCrisisEvent() {
77  }
78
79  }
80  }
81  }
82 }
```

Listing B.28: Messir Spec. file  
usecaseinstance-ugGlobalDispatchManagement-uciugGlobalDispatchManagement.msr.

## B.29 File ./src-gen/messir-spec/usecases/usecases.msr

```

1 /*
2 * @author Kira
3 * @date Tue Oct 25 23:54:03 CEST 2016
4 */
5
6 package lu.uni.lassy.excalibur.group09.spec.usecases {
7
8 import lu.uni.lassy.messir.libraries.calendar
9 import lu.uni.lassy.messir.libraries.math
10 import lu.uni.lassy.messir.libraries.primitives
11 import lu.uni.lassy.messir.libraries.string
12 import lu.uni.lassy.excalibur.group09.spec.environment
13 import lu.uni.lassy.excalibur.group09.spec.concepts.primarytypes.datatypes
14 import lu.uni.lassy.excalibur.group09.spec.concepts.secondarytypes.datatypes
15
16 Use Case Model {
17
18     use case system summary suGlobalManagementOfEvent() {
```

```

19 actor actCentralCoordinator[primary, active]
20 actor actCommunicationCompany[secondary, active]
21 actor actFiremenCoordinator[secondary, active]
22 actor actTowServiceCoordinator[secondary, active]
23
24 reuse ugCreateNewCrisisEvent[1...*]
25 reuse ugGlobalDispatchManagement[1...*]
26
27 step a: actCentralCoordinator executes ugCreateNewCrisisEvent
28 step b: actFiremenCoordinator executes ugGlobalDispatchManagement
29 step c: actTowServiceCoordinator executes ugGlobalDispatchManagement
30
31 ordering constraint "step (a) must be executed before step (b) or step (c)"
32 ordering constraint "step (b) XOR step (c)"
33
34 }
35
36 use case system usergoal ugCreateNewCrisisEvent() {
37   actor actCentralCoordinator[primary, active]
38   actor actCommunicationCompany[secondary, active]
39   actor actFiremenCoordinator[secondary, passive]
40   actor actTowServiceCoordinator[secondary, passive]
41
42   reuse oeAddNewCrisisEvent[1...*]
43   reuse oeRequestCrisisEventLocation[0...*]
44   reuse oeReceiveCrisisEventLocation[0...*]
45   reuse oeCreateNewCrisisEvent[1...*]
46   reuse oeMovePinOnMap[0...*]
47
48   step a: actCentralCoordinator executes oeAddNewCrisisEvent
49   step b: actCentralCoordinator executes oeRequestCrisisEventLocation
50   step c: actCommunicationCompany executes oeReceiveCrisisEventLocation
51   step d: actCentralCoordinator executes oeMovePinOnMap
52   step e: actCentralCoordinator executes oeCreateNewCrisisEvent
53
54   ordering constraint "step (a) must be executed first"
55   ordering constraint "if step (c) then previously step (b)"
56   ordering constraint "if step (d) then previously step (c)"
57   ordering constraint "step (e) executed as last"
58   ordering constraint "step (a), (b), (c), (e) must be executed at least once"
59 }
60
61 use case system usergoal ugGlobalDispatchManagement() {
62   actor actFiremenCoordinator[primary, active]
63   actor actTowServiceCoordinator[primary, active]
64   actor actCentralCoordinator[secondary, passive]
65   actor actPoliceCoordinator[secondary, active]
66
67   reuse oeGetCrisisEventInformation[2...*]
68   reuse oeUpdateDispatchStatus[4...*]
69   reuse oeRefreshMap[0...*]
70   reuse oeMessage[0...*]
71   reuse oeRequestHelp[0...*]
72   reuse oeCloseCrisisEvent[2...*]
73   reuse oeAddRequestHelp[0...*]
74
75   step a: actFiremenCoordinator executes oeGetCrisisEventInformation
76   step b: actFiremenCoordinator executes oeUpdateDispatchStatus
77   step c: actTowServiceCoordinator executes oeGetCrisisEventInformation
78   step d: actTowServiceCoordinator executes oeUpdateDispatchStatus
79   step e: actTowServiceCoordinator executes oeRefreshMap
80   step f: actTowServiceCoordinator executes oeMessage
81   step g: actFiremenCoordinator executes oeAddRequestHelp
82   step h: actFiremenCoordinator executes oeRequestHelp
83   step i: actPoliceCoordinator executes oeGetCrisisEventInformation
84   step j: actPoliceCoordinator executes oeUpdateDispatchStatus
85   step k: actFiremenCoordinator executes oeCloseCrisisEvent
86   step l: actTowServiceCoordinator executes oeCloseCrisisEvent
87   step m: actPoliceCoordinator executes oeCloseCrisisEvent
88 }
```

```

89  ordering constraint "if step (b),(d),(j) then previously step (a),(c),(i) respectively"
90  ordering constraint "if step (k),(l),(m) then previously step (b),(d),(j) at least two times
91   respectively"
92  ordering constraint "step (h) can only be executed if step (g) has at least been executed once
93   previously"
94  ordering constraint "if step (i) then previously step (h)"
95
96 use case system subfunction oeAddNewCrisisEvent() {
97   actor actCentralCoordinator[primary,active]
98 }
99
100 use case system subfunction oeRequestCrisisEventLocation(AdtPhoneNumber:dtPhoneNumber) {
101   actor actCentralCoordinator[primary,active]
102   actor actCommunicationCompany[secondary, passive]
103   returned messages{
104     ieRequestCrisisEventLocation(AdtPhoneNumber) returned to actCommunicationCompany //Slide 208..
105   }
106 }
107
108 use case system subfunction oeReceiveCrisisEventLocation(AdtGeoPos:dtGeoPos) {
109   actor actCommunicationCompany[primary, active]
110   actor actCentralCoordinator[secondary, passive]
111   returned messages{
112     ieReceiveCrisisEventLocation(AdtMapWithPin) returned to actCentralCoordinator
113   }
114 }
115
116 use case system subfunction oeMovePinOnMap() {
117   actor actCentralCoordinator[primary,active]
118   returned messages{
119     ieReceiveCrisisEventLocation(AdtMapWithPin) returned to actCentralCoordinator
120   }
121 }
122
123 use case system subfunction oeCreateNewCrisisEvent(AName:dtString, AetHumanType:etHumanType,
124   AdtPhoneNumber:dtPhoneNumber, AdtMapWithPin:dtMapWithPin, AdtComment:dtComment) {
125   actor actCentralCoordinator[primary,active]
126   actor actAbstractDispatchCoordinator[secondary,passive]
127   returned messages{
128     ieReceiveNewCrisisEvent(AdtCrisisID, AdtMessage) returned to actAbstractDispatchCoordinator
129   }
130
131 use case system subfunction oeGetCrisisEventInformation(AdtGeoPos:dtGeoPos) {
132   actor actAbstractDispatchCoordinator[primary,active]
133   returned messages{
134     ieReceiveCrisisEventInformation (AdtCrisisID, AdtName, AetHumanType, AdtPhoneNumber,
135       AdtMapWithPin, AdtComment) returned to actAbstractDispatchCoordinator
136   }
137
138 use case system subfunction oeMessage(AdtComment:dtComment) {
139   actor actAbstractDispatchCoordinator[primary,active]
140   actor actCentralCoordinator[secondary, passive]
141   actor actAbstractDispatchCoordinator[secondary, multiple]
142   returned messages{
143     ieMessageAbstractDispatchCoordinator(AdtComment) returned to actAbstractDispatchCoordinator
144     ieMessageCentralCoordinator(AdtComment) returned to actCentralCoordinator
145   }
146 }
147
148 use case system subfunction oeUpdateDispatchStatus(AetDispatchStatus:etDispatchStatus){
149   actor actAbstractDispatchCoordinator[primary,active]
150   returned messages{
151     ieMessageAbstractDispatchCoordinator(AdtComment) returned to actAbstractDispatchCoordinator
152   }
153 }
154

```

```

155  use case system subfunction oeRefreshMap(AdtGeoPos:dtGeoPos) {
156    actor actAbstractDispatchCoordinator[primary,active]
157    returned messages{
158      ieReceiveMap(AdtMapWithPin) returned to actAbstractDispatchCoordinator
159    }
160  }
161
162  use case system subfunction oeAddRequestHelp() {
163    actor actFiremenCoordinator[primary,active]
164  }
165
166  use case system subfunction oeRequestHelp(AetTeamType: etTeamType, RequestedNumber:ptInteger) {
167    actor actFiremenCoordinator[primary,active]
168    actor actAbstractDispatchCoordinator[secondary,passive]
169    returned messages{
170      ieReceiveNewCrisisEvent(AdtCrisisID, AdtMessage) returned to actAbstractDispatchCoordinator
171    }
172  }
173
174  use case system subfunction oeCloseCrisisEvent() {
175    actor actAbstractDispatchCoordinator[primary,active]
176  }
177
178 }
179
180 }
```

Listing B.29: Messir Spec. file usecases.msr.





# Bibliography

- [1] Guelfi, N.: Messir: A Scientific Method for the Software Engineer. to be published (2017)
- [2] Armour, F., Miller, G.: Advanced Use Case Modeling: Software Systems. Addison-Wesley (2001)