MILESTONE 2.2: SYSTEM REQUIREMENTS

343.309, UE Software Engineering

Winter-Semester 2020

033 521

TOPIC

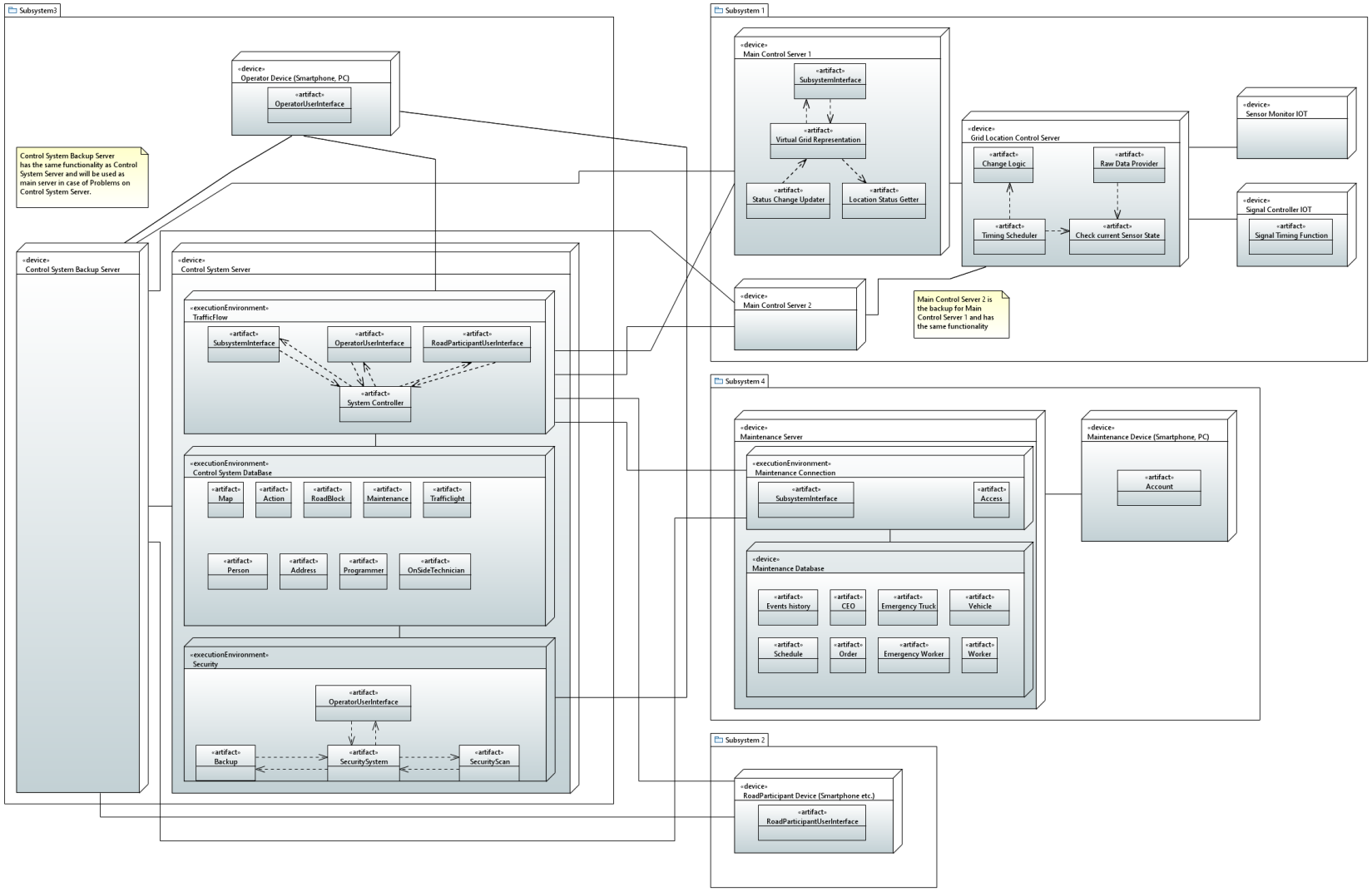
Entire System

Group Nr.2:

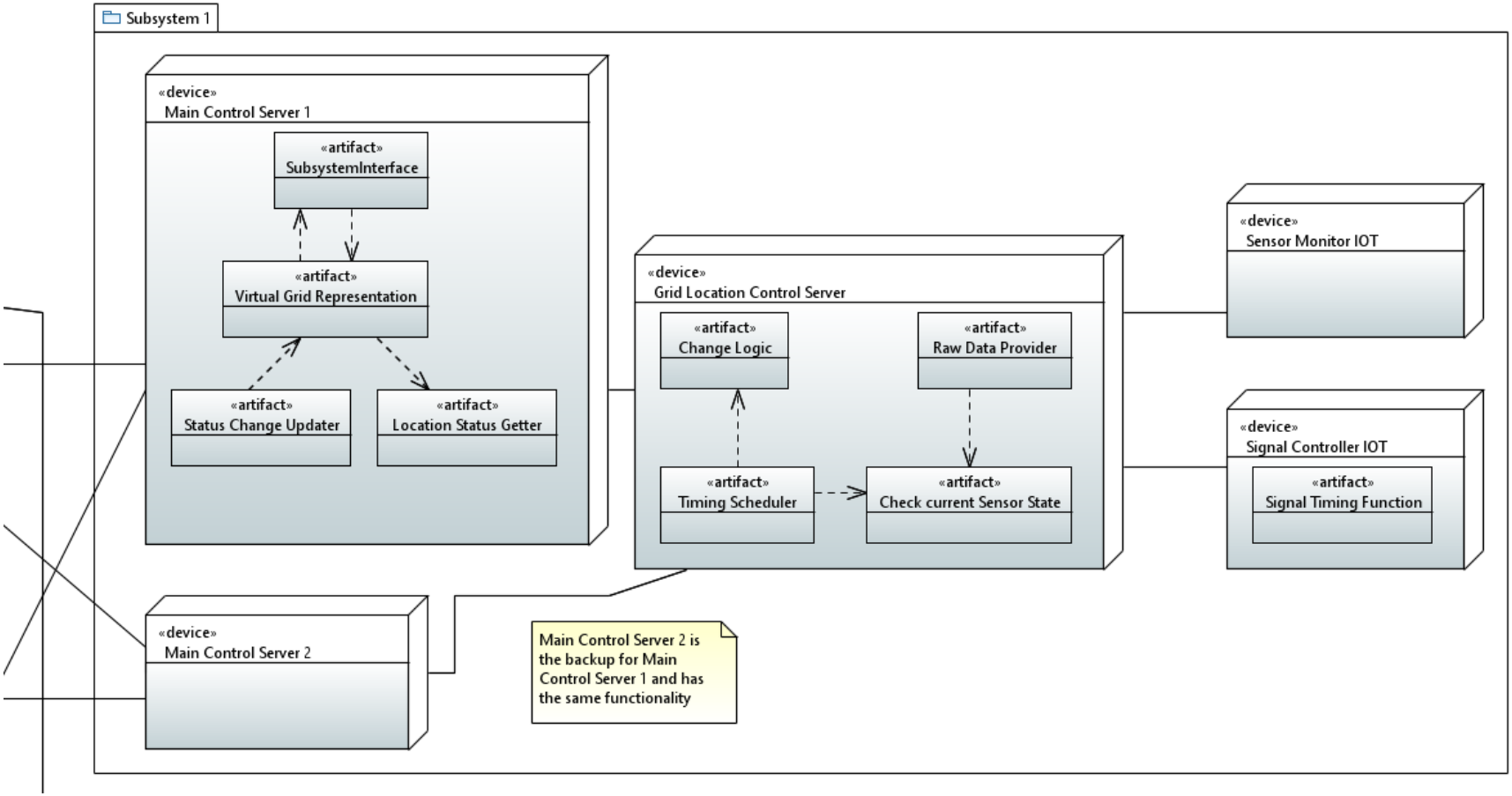
- **Omar Dueñas:** Subsystem II
K51849509, roqueluisd@me.com
- **Michael Lengauer**: Subsystem I
K11710940, lengauer.michael@gmail.com
- **Mario Lischka**: Subsystem III Traffic Flow
K11712790, Mario.lischka@gmx.at
- **Eduard-Florin Hogea**, Subsystem IV
K12019919, eduard.hogea00@e-uvt.ro
- **Lukas Wais**: Subsystem III Security
K11816105, lukas.wais@outlook.de

1. deployment diagram

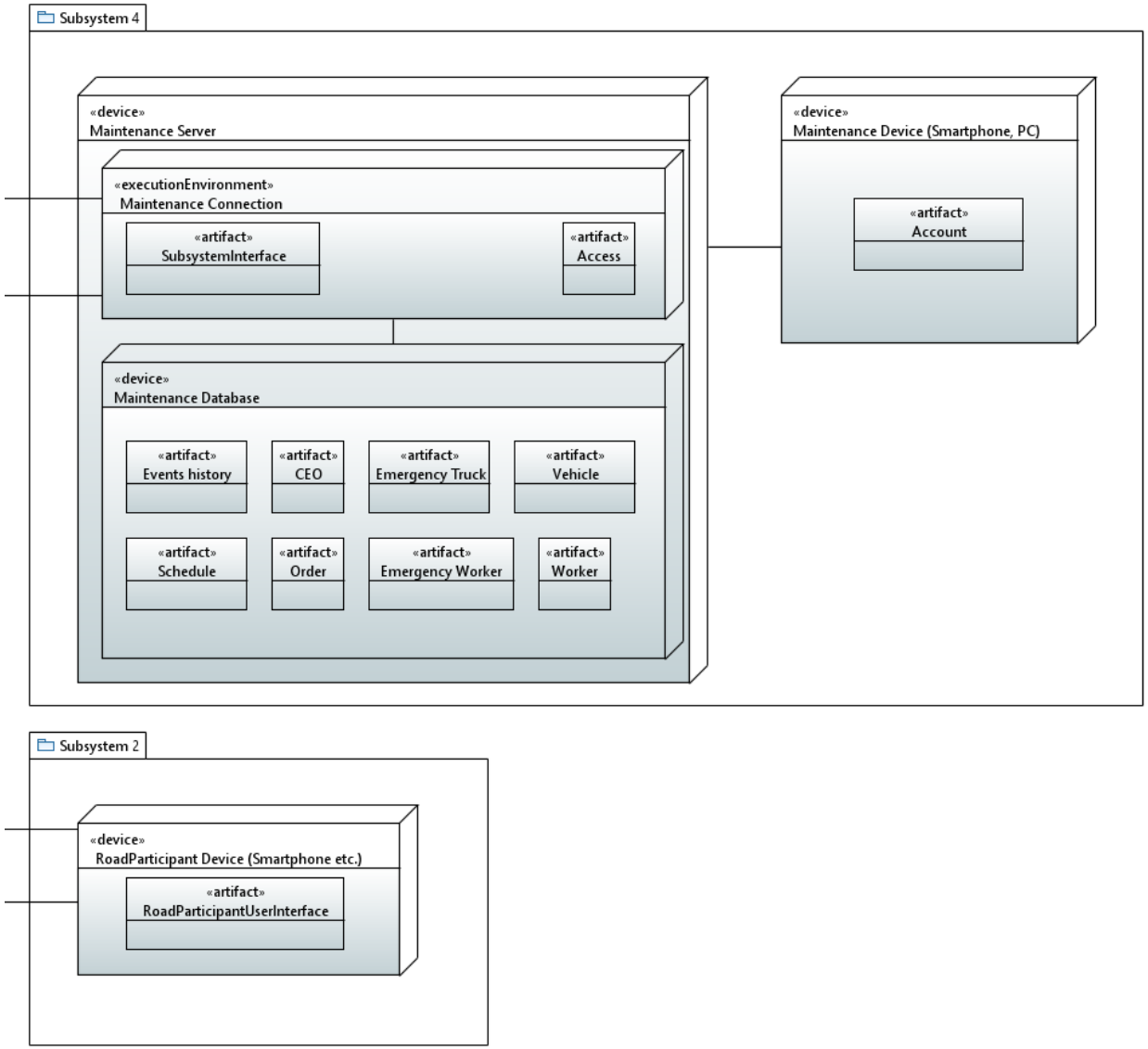
Howl diagram



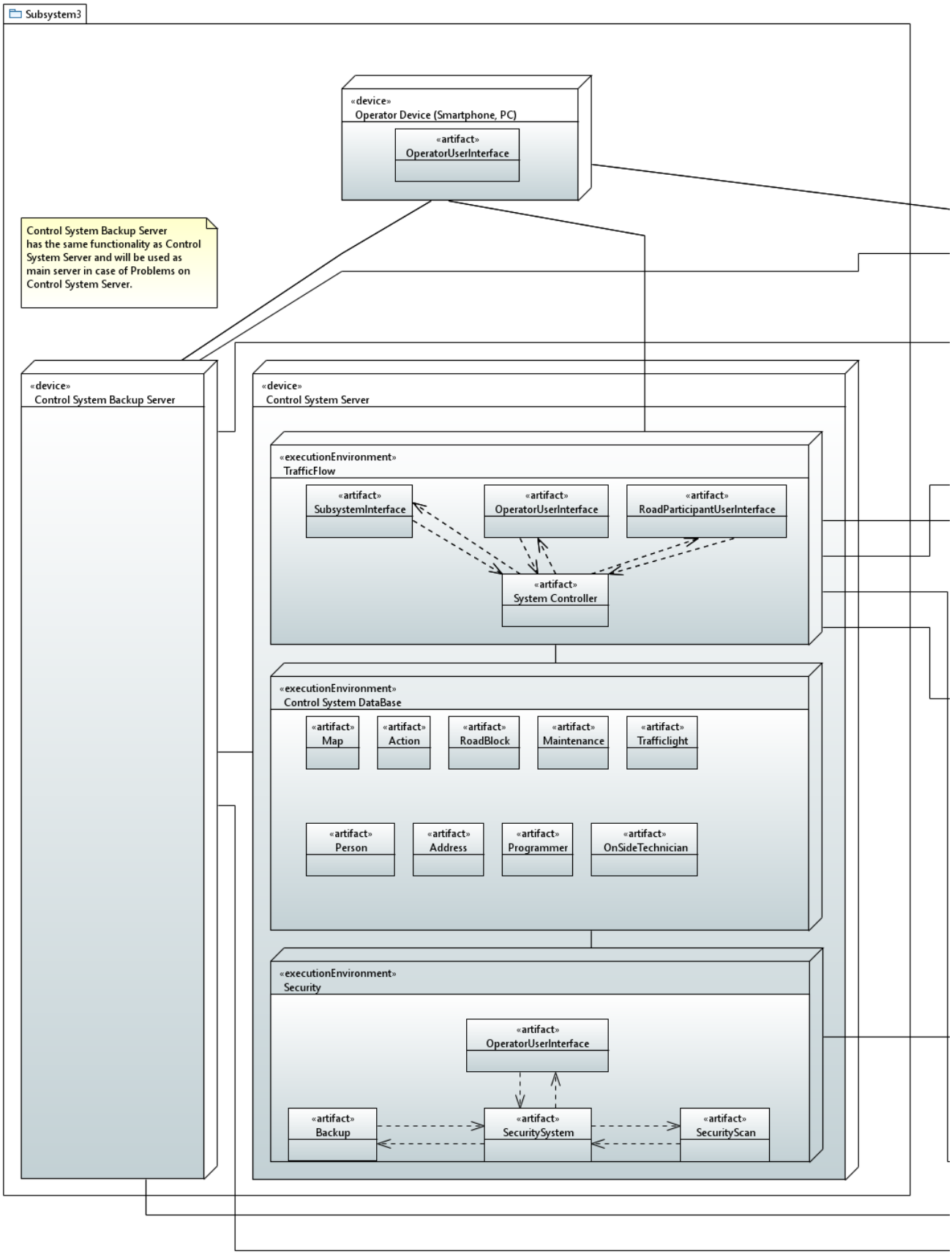
Deplyment Subsystem 1



System 4 und 2



Subsystem 3

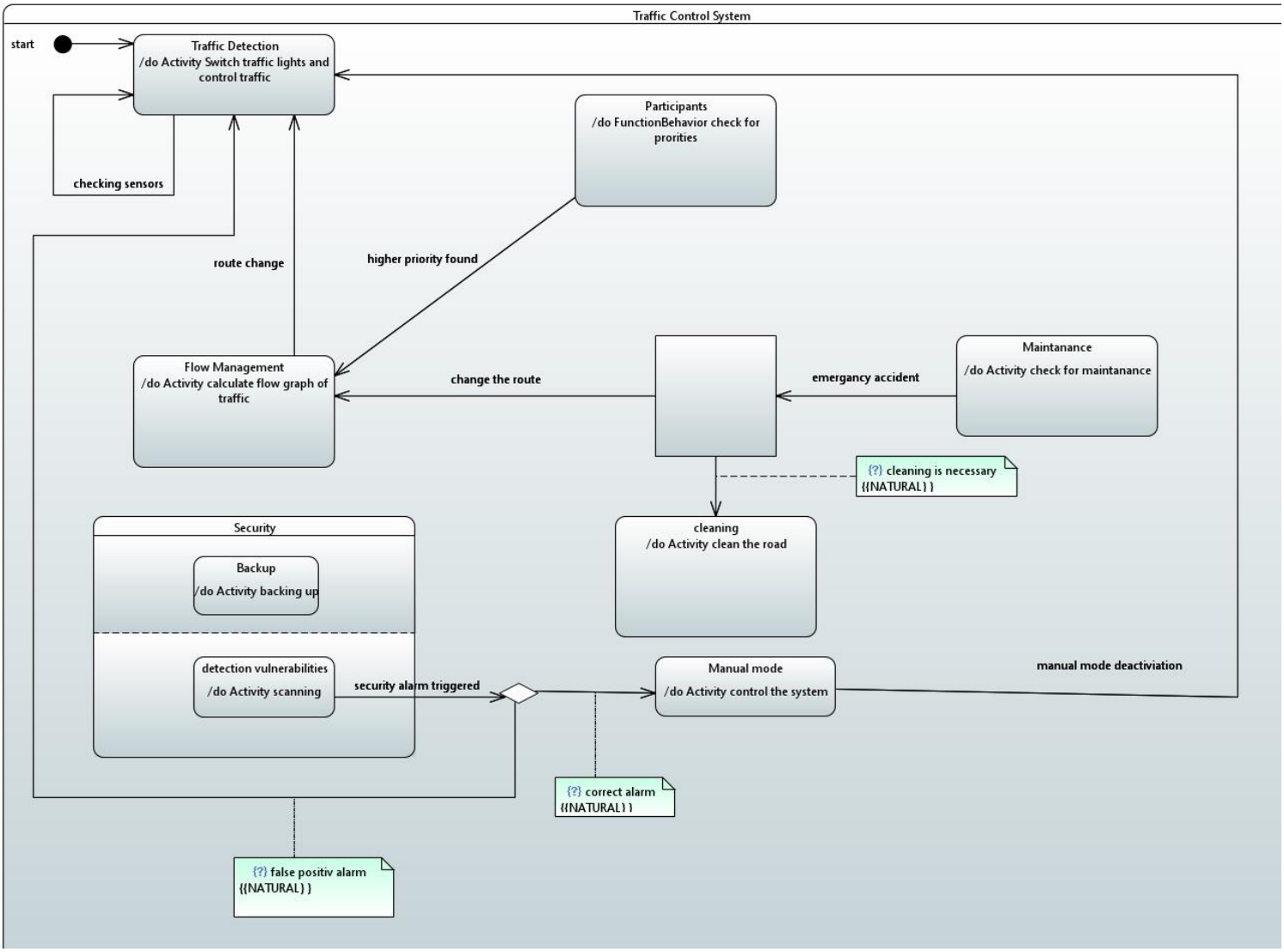

Subsystem3
«device»
Operator Device (Smartphone, PC)
«artifact»
OperatorUserInterface
Control System Backup Server has the same functionality as Control System Server and will be used as main server in case of Problems on Control System Server.
«device»
Control System Backup Server
«device»
Control System Server
«executionEnvironment»
TrafficFlow
«artifact»
SubsystemInterface
«artifact»
OperatorUserInterface
«artifact»
RoadParticipantUserInterface
«artifact»
System Controller
«executionEnvironment»
Control System DataBase
«artifact»
Map
«artifact»
Action
«artifact»
RoadBlock
«artifact»
Maintenance
«artifact»
Trafficlight
«artifact»
Person
«artifact»
Address
«artifact»
Programmer
«artifact»
OnSideTechnician
«executionEnvironment»
Security
«artifact»
OperatorUserInterface
«artifact»
Backup
«artifact»
SecuritySystem
«artifact»
SecurityScan

Deployment Diagram Description:

- Subsystem 1
  - Main Control Server 1
    The Main Control Server 1 is used for connection to other subsystems via the SubsystemInterface.
    - SubsystemInterface
      is the Interface for communication between subsystems
    - Virtual Grid Representation
    - Status Change Updater
    - Location Status Getter
  - Main Control Server 2
    is the Backup server for Main Control Server 2
  - Grid Location Control Server
    - Change Logic
    - Timing Scheduler
    - Raw Data Provider
    - Check current Sensor State
  - Sensor Monitor IOT
  - Signal Controller IOT
    - Signal Timing Function
- Subsystem 2
  - RoadParticipant Device
    It is the device the road participants install their traffic flow app
    - RoadParticipantUserInterface
      is used for communication between the control system and the road participant app
- Subsystem 3
  - Operator Device
    is the Device the Operator is using to use traffic flow and the security components
    - OperatorUserInterface
      is used to communicate with the Control System Server
  - Control System Server
    - TrafficFlow
      - System Controller
        is the main control in the Traffic flow, every data that is send to or from an interface must pass System Controller.
        Holds the functionality for Traffic flow
      - Subsysteminterface
        is the Interface for communication between subsystems

        - OperatorUserInterface
          is the Interface for communication with the Operator PC
        - RoadParticipantUserInterface
          is the Interface for communication with all RoadParticipant Devices
    - Control System DataBase
      is a data base which holds the data for TrafficFlow and Security (every artefact is a table)
    - Security
        - OperatorUserInterface
          is the Interface for communication with the Operator PC
        - SecuritySystem
          is the main control in the Security, manages the Backups and the SecurityScan
        - SecurityScan
          Scans the System for security reasons
        - Backup
          Backs up the data to the Backup Server
  - Control System Backup Server
    is the backup server for Control System Server
- Subsystem 4
  - Maintenance Server
    - Maintenance Connection
      is used for different connections to the Database
        - SubsystemInterface
          is the Interface for communication between subsystems
        - Access
          is the actual Connection the Maintenance Device uses to grand access
    - Maintenance Database
      is a data base which holds the data from Maintenance (every artefact is a table)
  - Maintenance Device
    - Account
      the maintenance Device hold the Account which was logged into at the Device and uses it to Access the Maintenance Server

2. state machine diagram



Traffic Detection

- This is a very important state since it controls the actual traffic. It is the interface between traffic and the participants.
- While it is checking the sensors, it is staying in this state.

Participants

- This state is checking if it there is a participant with a higher priority.
- If this is the case the flow management is getting notified to control the traffic accordingly.

Flow Management

- This state does take care about the actual routes. It does calculate the best one.
- If a route change is necessary, the control system gets notified.

Maintenance

- Checks whether a route needs to be cleaned, it also knows if there are some accidents.
- If an emergency accident happens the transition goes into a fork. It does notify the flow management if that a route change is necessary. When cleaning is needed (constraint) it also transitions to the cleaning state.

Cleaning

- Does clean the road regularly.

Security

This state does have two substates which are running simultaneously.

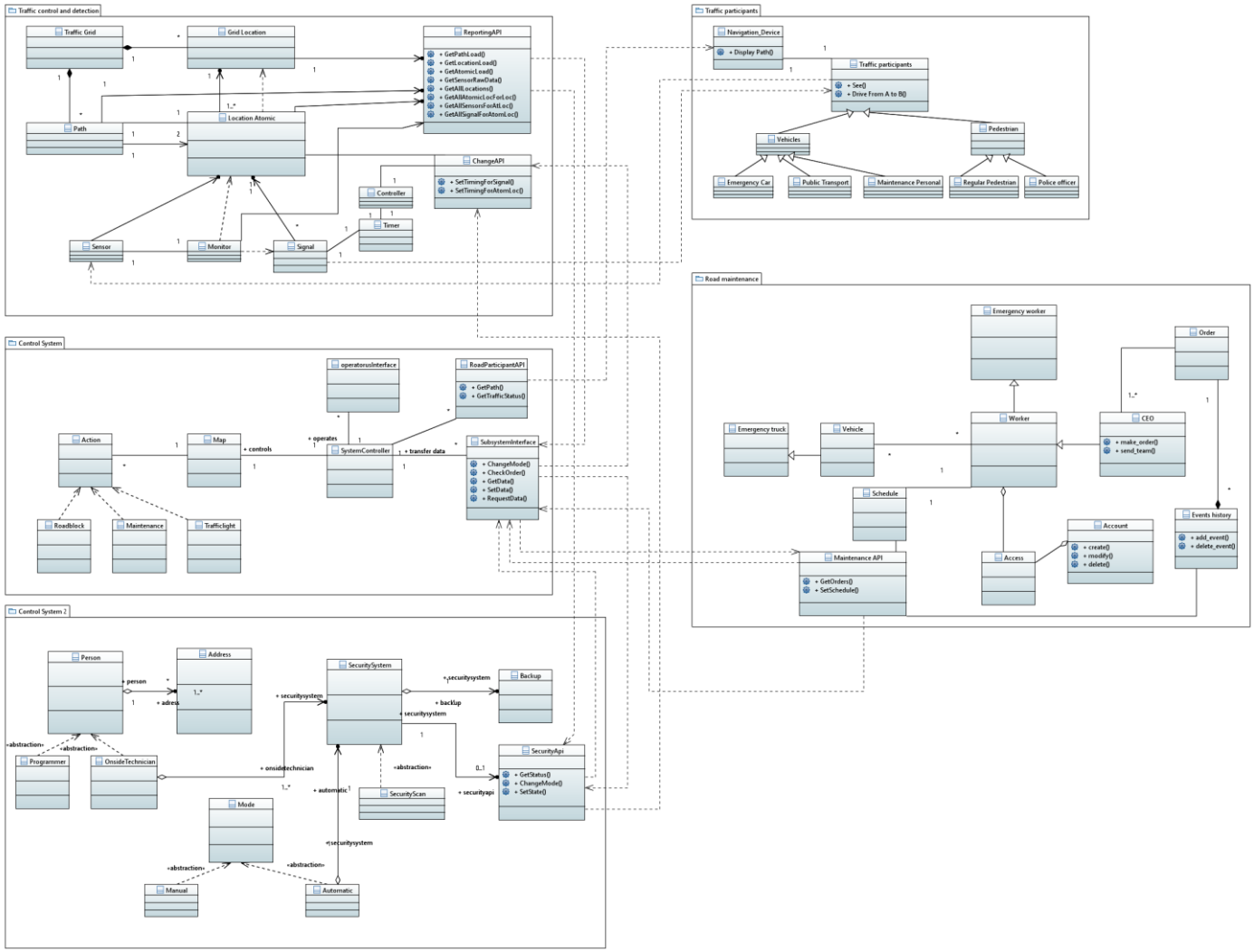
- On is the backup state.
- The other one is the detection of vulnerabilities. If a security alarm is triggered it goes to a decision.
    - If the alarm is correct it transitions to the manual mode.
    - Otherwise it goes back to the traffic detection → it stays in automatic mode.

Manual Mode

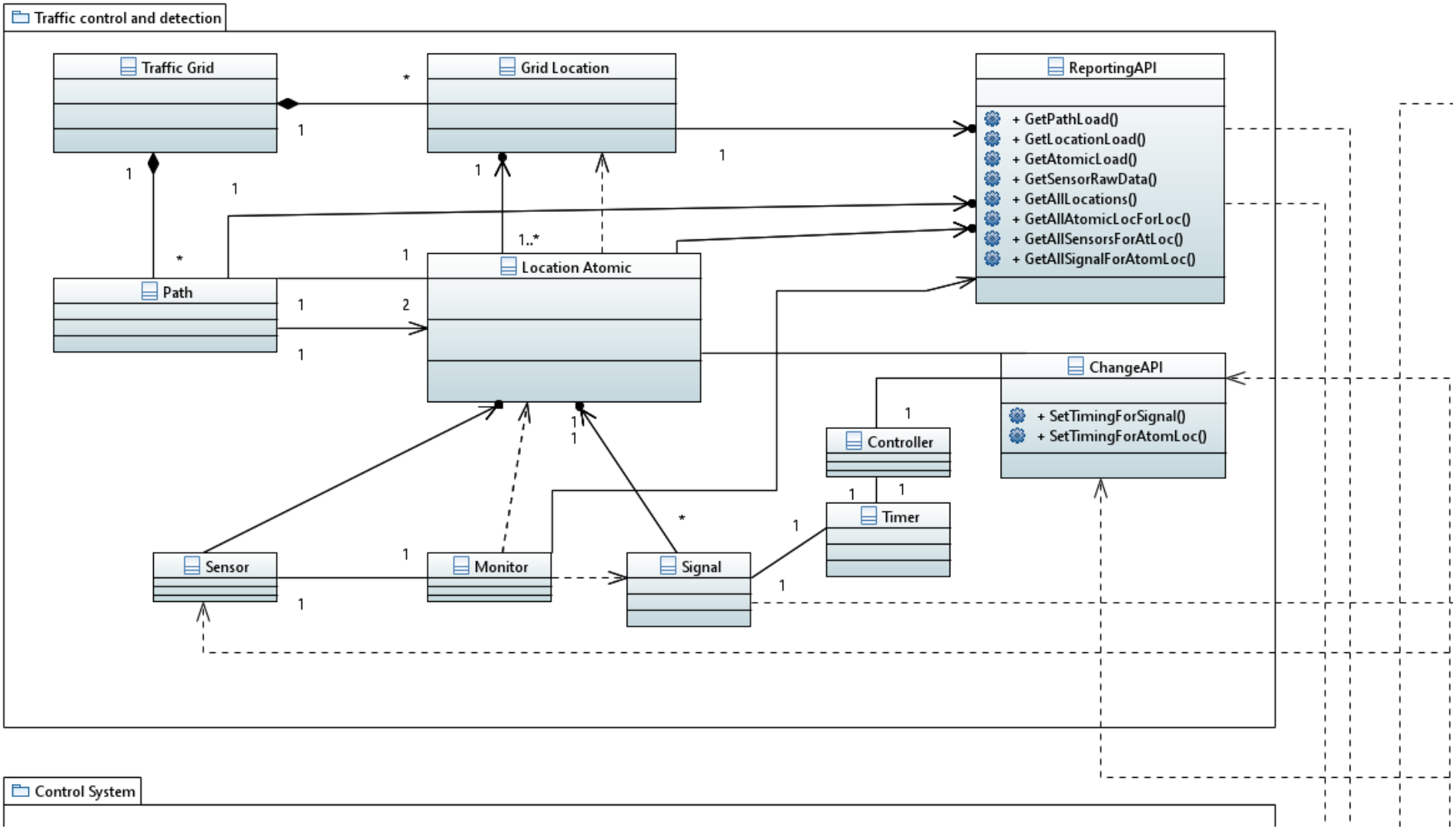
- Until deactivation the system is controlled manually (= it stays in the state).
- By deactivation does go back to the traffic detection. The automatic mode up on again.

3. class diagram

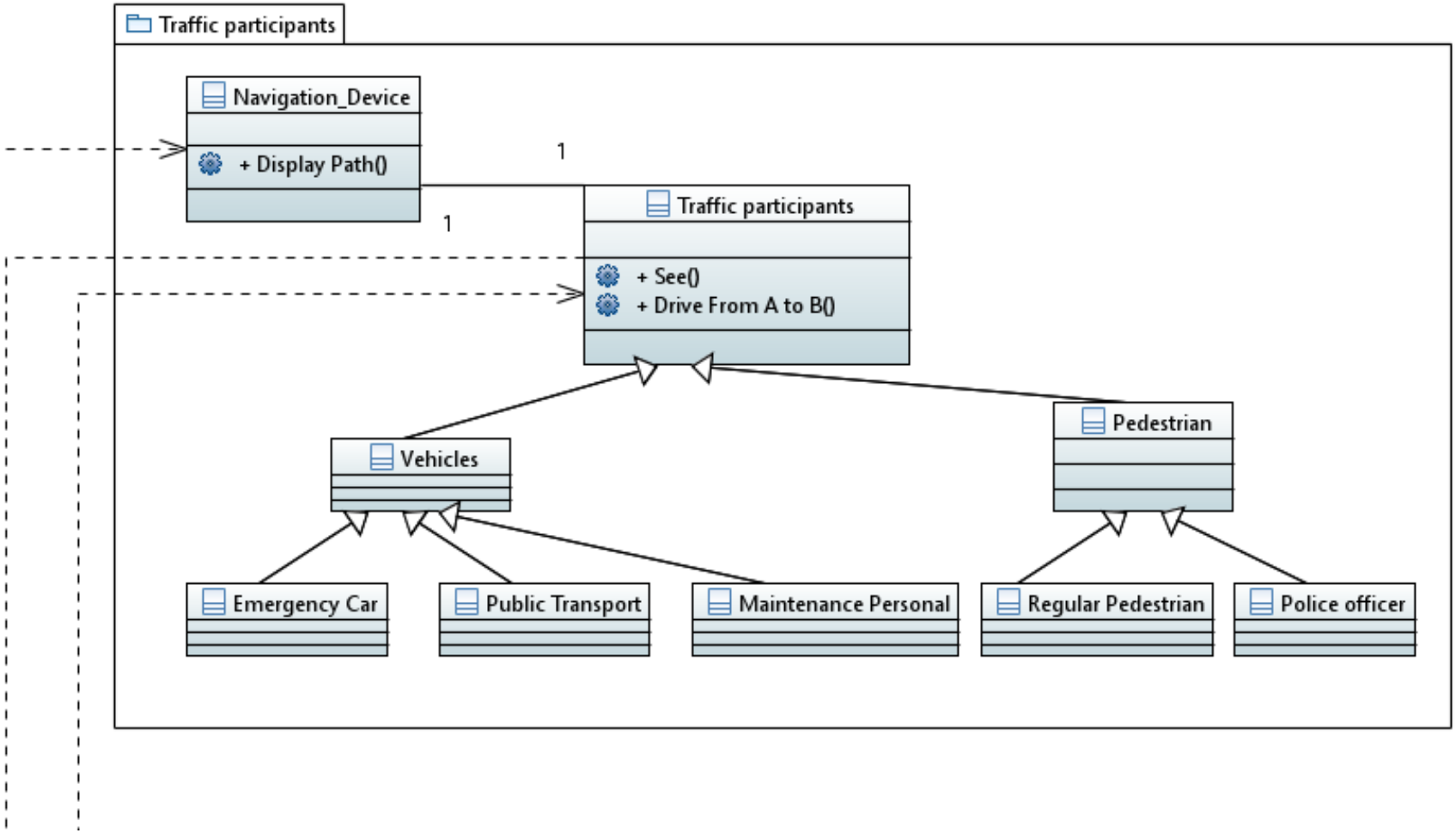
Howl Diagram



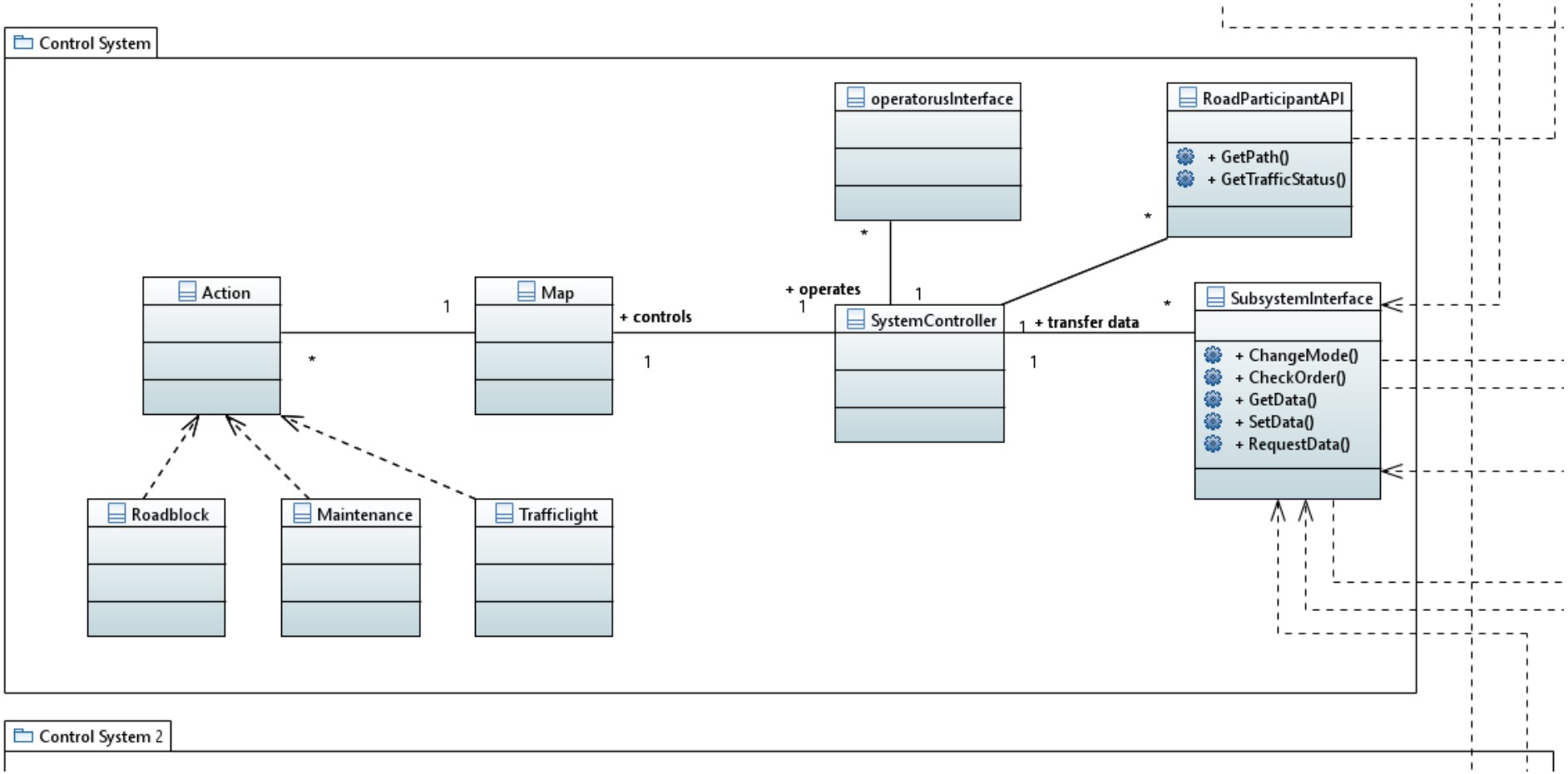
Subsystem 1


Traffic control and detection
Traffic Grid
Grid Location
ReportingAPI
+ GetPathLoad()
+ GetLocationLoad()
+ GetAtomicLoad()
+ GetSensorRawData()
+ GetAllLocations()
+ GetAllAtomicLocForLoc()
+ GetAllSensorsForAtLoc()
+ GetAllSignalForAtomLoc()
Path
Location Atomic
ChangeAPI
+ SetTimingForSignal()
+ SetTimingForAtomLoc()
Controller
Timer
Sensor
Monitor
Signal
Control System

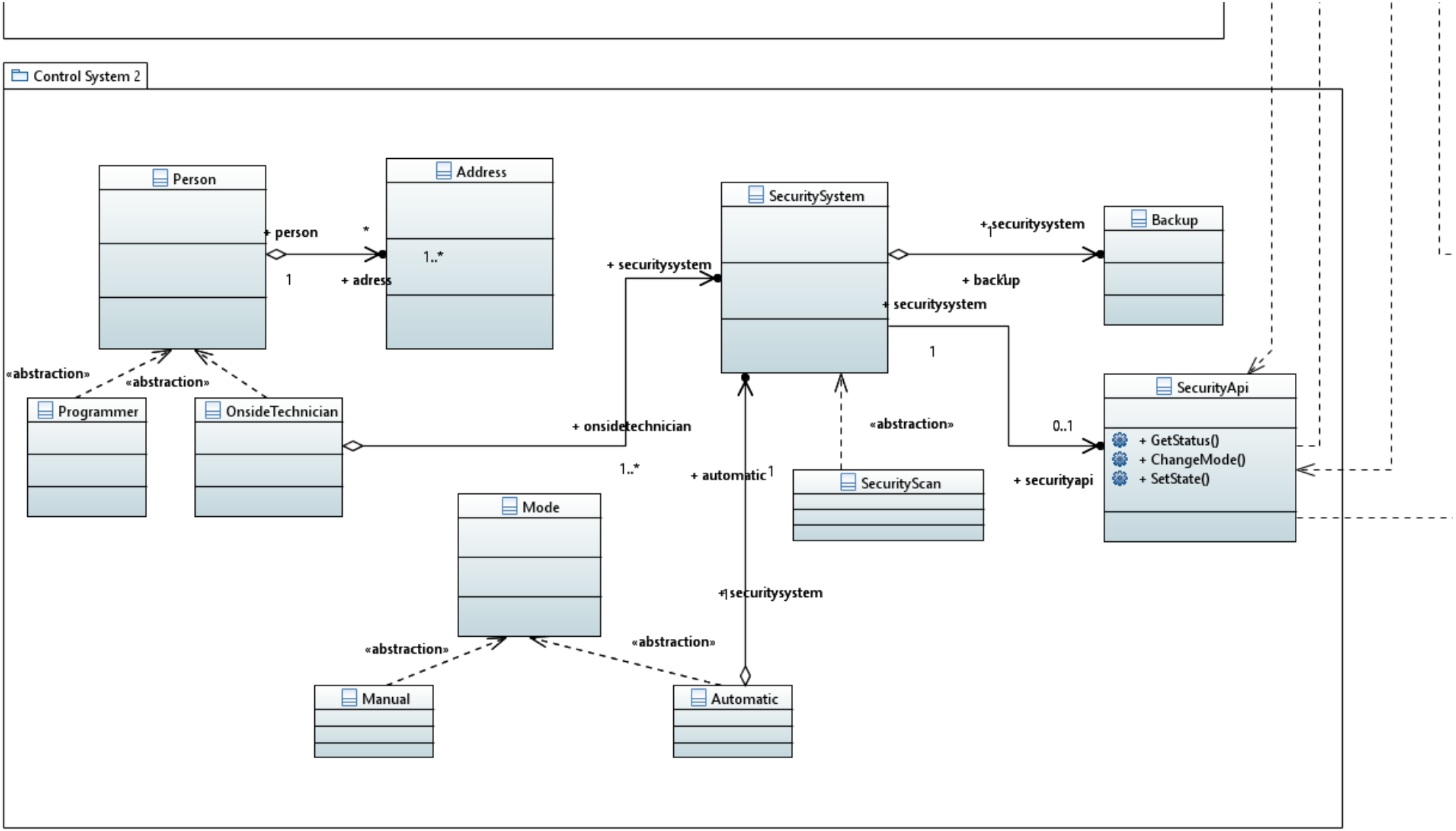
Subsystem 2


Traffic participants
Navigation_Device
+ Display Path()
1
1
Traffic participants
+ See()
+ Drive From A to B()
Vehicles
Pedestrian
Emergency Car
Public Transport
Maintenance Personal
Regular Pedestrian
Police officer

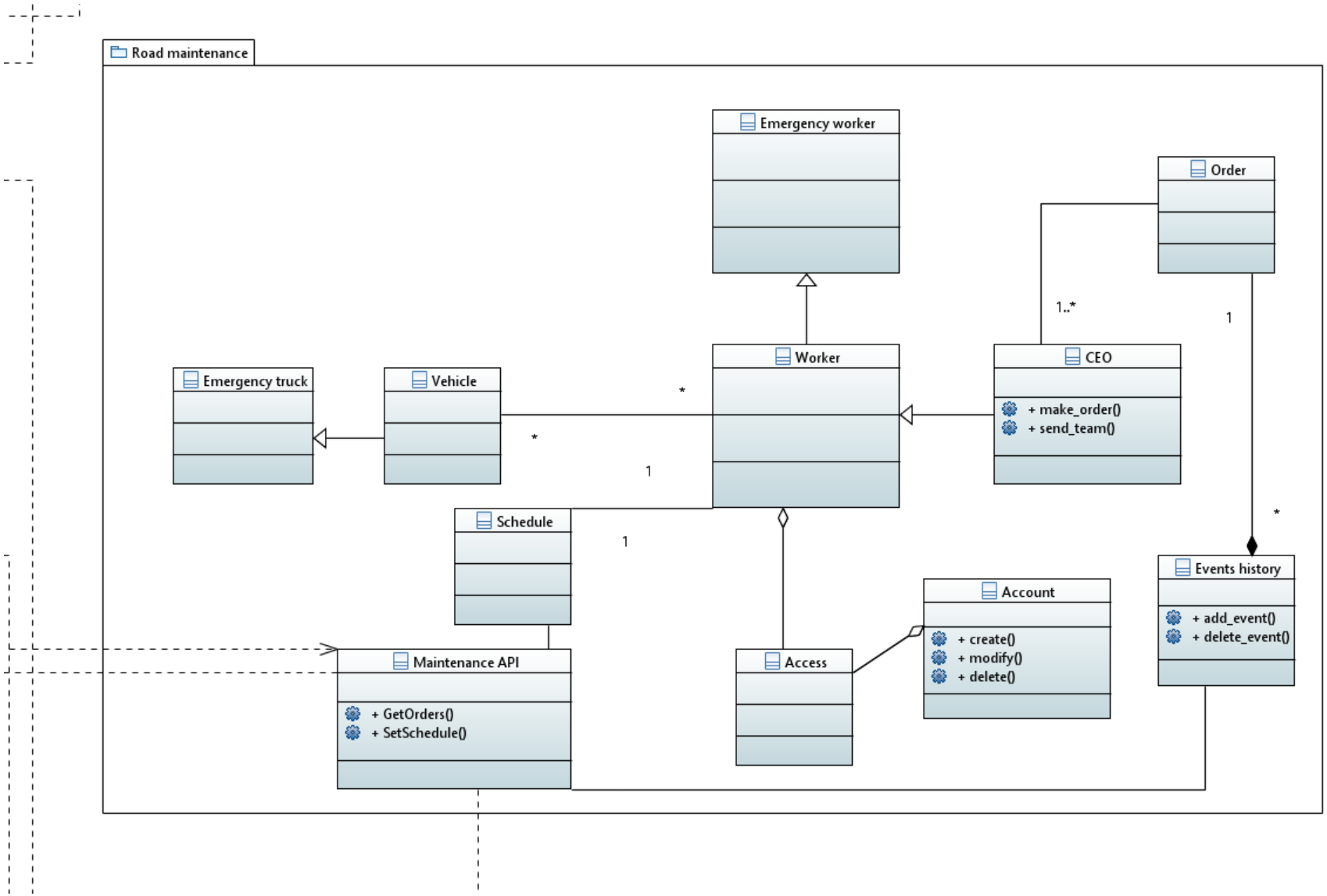
Subsystem 3.1



Subsystem 3.2



Subsystem 4


Road maintenance
Emergency worker
Order
Worker
CEO
+ make_order()
+ send_team()
Emergency truck
Vehicle
Schedule
Events history
+ add_event()
+ delete_event()
Account
+ create()
+ modify()
+ delete()
Maintenance API
+ GetOrders()
+ SetSchedule()
Access
1..*
1
*
*
1
1
*

Howl System Diagram Description

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