

## Hazardous events

This document lists hazardous events derived from both cooperative and vehicular perspectives and goals to prevent them. Each hazardous event is a combination of a hazard an operational mode, and an operational situation. For the list of hazards refer to the file “Hazards and associated Functions”. The following 7 operational modes are identified for cooperative perspective: *platooning, forming platoon, disbanding platoon, growing platoon, shrinking platoon, merging with other platoon, splitting into two platoons*. While the following 6 operational modes are identified for vehicular perspective: *joining platoon, leaving platoon, leader of platoon, following vehicle in platoon, switch from follower to leader, switch from leader to follower*. This work scopes to 2 operational situations for platooning: highway and highway interchange. From a vehicular perspective there are two operational modes: driving inside platoon and outside platoon.

The rest of this document contains two tables that lists hazardous events and goals to prevent them. The first table is for cooperative perspective and the second is for vehicular perspective.

## Hazardous events and goals from cooperative perspective

Hazard	Operational Mode	Operational Situation	Goal to prevent hazardous event
Not keeping optimized inter-vehicular distance with in a platoon	Platooning	Highway	Vehicles in a platoon shall always keep optimal inter-vehicular distance when platooning on the highway
	Forming platoon		While forming a platoon, vehicles shall always keep proper distance between them when on the highway
	Disbanding platoon		While disbanding, vehicles in the platoon shall always keep proper distance between them when on the highway
	Growing platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when a new vehicle joins the platoon on the highway
	Shrinking platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when a vehicle leaves their platoon on the highway
	Merging with other platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon merges with another platoon on the highway
	Splitting into two platoons		Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon splits into two platoons on the highway
Keeping more than optimal inter-vehicular distance with in a platoon	Platooning	Highway	Vehicles in a platoon shall always keep optimal distance between them when platooning on the highway
	Forming platoon		While forming a platoon, vehicles shall always keep optimal distance between them when on the highway
	Disbanding platoon		While disbanding a platoon, vehicles shall always keep optimal distance between them when on the highway
	Growing platoon		Vehicles in a platoon shall always keep optimal distance between them when a new vehicle joins the platoon on the highway
	Shrinking platoon		Vehicles in a platoon shall always keep optimal distance between them when a vehicle leaves their platoon on the highway
	Merging with other platoon		Vehicles in a platoon shall always keep optimal distance between them when their platoon merges with another platoon on the highway
	Splitting into two platoons		Vehicles in a platoon shall always keep optimal distance between them when their platoon splits into two platoons on the highway
Does not keep optimized inter-vehicular distance with in a platoon	Platooning	Highway	Vehicles in a platoon shall always keep optimal distance between them when platooning on the highway
	Forming platoon		While forming a platoon, vehicles shall always keep optimal distance between them when on the highway
	Disbanding platoon		While disbanding a platoon, vehicles shall always keep optimal distance between them when on the highway
	Growing platoon		Vehicles in a platoon shall always keep optimal distance between them when a new vehicle joins the platoon on the highway
	Shrinking platoon		Vehicles in a platoon shall always keep optimal distance between them when a vehicle leaves their platoon on the highway

	Merging with other platoon		Vehicles in a platoon shall always keep optimal distance between them when their platoon merges with another platoon on the highway
	Splitting into two platoons		Vehicles in a platoon shall always keep optimal distance between them when their platoon splits into two platoons on the highway
Optimized inter-vehicular distance is not kept in some part of platoon	Platooning	Highway	All Vehicles in a platoon shall always keep optimal inter-vehicular distance when platooning on the highway
	Forming platoon		While forming a platoon, all vehicles in the platoon shall always keep proper distance between them when on the highway
	Disbanding platoon		While disbanding, all vehicles in the platoon shall always keep proper distance between them when on the highway
	Growing platoon		All Vehicles in a platoon shall always keep optimal inter-vehicular distance when a new vehicle joins the platoon on the highway
	Shrinking platoon		All Vehicles in a platoon shall always keep optimal inter-vehicular distance when a vehicle leaves their platoon on the highway
	Merging with other platoon		All Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon merges with another platoon on the highway
	Splitting into two platoons		All Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon splits into two platoons on the highway
Does not make place for a vehicle to join platoon	Platooning	Highway	Vehicles in a platoon shall make place for a vehicle that wants to join the platoon on the highway
	Forming platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon is forming on the highway
	Growing platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon is growing on the highway
	Merging with other platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon merges with another platoon on the highway
More than optimal space is created for a vehicle to join platoon	Platooning	Highway	Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon on the highway
	Forming platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is forming on the highway
	Growing platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is growing on the highway
	Merging with other platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon merges with another platoon on the highway
Less than optimal space is created for a vehicle to join platoon	Platooning	Highway	Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon on the highway
	Forming platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is forming on the highway
	Growing platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is growing on the highway
	Merging with other platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon merges with another platoon on the highway
Only a part of the platoon (not all of the	Platooning	Highway	All vehicles in a platoon that are responsible for joining a new vehicle shall make place for it on the highway

designated vehicles in the platoon) make place for a vehicle to join platoon	Forming platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for it during platoon forming on the highway
	Growing platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle when the platoon is growing on the highway
	Merging with other platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle when the platoon merges with another platoon on the highway
Platoon decreases inter-vehicular distance when making place to join platoon (reverses of making a place - reducing space)	Platooning	Highway	Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon on the highway
	Forming platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon is forming on the highway
	Growing platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon is growing on the highway
	Merging with other platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon merges with another platoon on the highway
Platoon breaks up when vehicle wants to join (other possible scenario while making place)	Platooning	Highway	A platoon shall not be disbanded when a vehicle wants to join while platooning on the highway
	Forming platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon is forming on the highway
	Growing platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon is growing on the highway
	Merging with other platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon merges with another platoon on the highway
Platoon does not merge with other platoon when desired	Merging with other platoon	Highway	A platoon shall always merge with another platoon when this is desired while on the highway
Platoon merges with more than one platoon while it shall only be merging with one	Merging with other platoon	Highway	A platoon shall always merge with only one other platoon while on the highway
Only part of the platoon merges with another platoon while merging	Merging with other platoon	Highway	A platoon shall always completely merge with another platoon during the merging process on the highway
Another platoon merges with current platoon while the reverse is desired	Merging with other platoon	Highway	Merger and mergee roles shall be properly conformed to between two platoons while they merge on the highway
The platoon does not split when a split is desired	Splitting into two platoons	Highway	A platoon shall always actually split into two platoons when this is desired while on the highway
Platoon splits into more than two platoons	Splitting into two platoons	Highway	A platoon shall always split into exactly two other platoons when splitting on the highway
The platoon splits and merges into a platoon while only a split is desired	Splitting into two platoons	Highway	A platoon shall never merge with another platoon while splitting on the highway

After the split less than two platoons remain since the resulting platoons contain less than two vehicles	Splitting into two platoons	Highway	A platoon shall always split into exactly two other platoons when splitting on the highway
Leading vehicle is not changed while this is desired	Platooning	Highway	The leader of a platoon shall always be changed when this is desired while platooning on the highway
	Merging with other platoon		The leader of a platoon shall always be changed while the platoon merges with another platoon on the highway
	Splitting into two platoons		The leader of a platoon shall always be changed when the platoon splits into two platoons on the highway
Multiple vehicles in a platoon are assigned leader role while only one vehicle shall.	Platooning	Highway	A platoon shall always have at most one leader while platooning on the highway
	Merging with other platoon		A platoon shall always have one leader during and after merging with another platoon on the highway
	Splitting into two platoons		Both platoons resulting from a platoon split shall have one leader each during and after splitting on the highway
First follower is not assigned the leader role when the leader leaves a platoon	Platooning	Highway	A platoon shall always have exactly one new leader when its current leader leaves while platooning on the highway
	Merging with other platoon		A platoon shall always have exactly one leader when the platoon merges with another platoon on the highway
	Splitting into two platoons		Both platoons resulting from a platoon split shall have one leader each during and after splitting on the highway
Platoon breaks up when the leading vehicle is changed	Platooning	Highway	A platoon shall not break up when the leading vehicle is being changed while platooning on the highway
	Merging with other platoon		A platoon shall not break up when the leading vehicle is being changed while the platoon merges with another platoon on the highway
	Splitting into two platoons		A platoon shall not break up when the leading vehicle is being changed when a platoon splits into two platoons on the highway
Platoon does not keep proper distance to surrounding vehicles	Platooning	Highway	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on the highway
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on the highway
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on the highway
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on the highway
	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on the highway
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on the highway

	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on the highway
Platoon keeps more than enough distance to surrounding vehicles	Platooning	Highway	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on the highway
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on the highway
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on the highway
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on the highway
	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on the highway
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on the highway
	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on the highway
Platoon keeps less than enough distance to surrounding vehicles	Platooning	Highway	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on the highway
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on the highway
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on the highway
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on the highway
	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on the highway
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on the highway
	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on the highway
Only some of the vehicles in the platoon keep proper distance to surrounding vehicles	Platooning	Highway	All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on the highway
	Forming platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on the highway
	Disbanding platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on the highway
	Growing platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on the highway

	Shrinking platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on the highway
	Merging with other platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on the highway
	Splitting into two platoons		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on the highway
Not keeping optimized inter-vehicular distance with in a platoon	Platooning	Highway interchange	Vehicles in a platoon shall always keep optimal inter-vehicular distance when platooning on a transition between highways
	Forming platoon		While forming a platoon, vehicles shall always keep proper distance between them when on a transition between highways
	Disbanding platoon		While disbanding, vehicles in the platoon shall always keep proper distance between them when on a transition between highways
	Growing platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when a new vehicle joins the platoon on a transition between highways
	Shrinking platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when a vehicle leaves their platoon on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon merges with another platoon on a transition between highways
	Splitting into two platoons		Vehicles in a platoon shall always keep optimal inter-vehicular distance when their platoon splits into two platoons on a transition between highways
Keeping more than optimal inter-vehicular distance with in a platoon	Platooning	Highway interchange	Vehicles in a platoon shall always keep optimal distance between them when platooning on a transition between highways
	Forming platoon		While forming a platoon, vehicles shall always keep optimal distance between them when on a transition between highways
	Disbanding platoon		While disbanding a platoon, vehicles shall always keep optimal distance between them when on a transition between highways
	Growing platoon		Vehicles in a platoon shall always keep proper distance between them when a new vehicle joins the platoon on a transition between highways
	Shrinking platoon		Vehicles in a platoon shall always keep proper distance between them when a vehicle leaves their platoon on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall always keep proper distance between them when their platoon merges with another platoon on a transition between highways
	Splitting into two platoons		Vehicles in a platoon shall always keep proper distance between them when the platoon splits into two platoons on a transition between highways
Does not keep optimized inter-vehicular distance with in a platoon	Platooning	Highway interchange	Vehicles in a platoon shall always keep optimal distance between them when platooning on a transition between highways
	Forming platoon		While forming a platoon, vehicles shall always keep proper distance between them when on a transition between highways
	Disbanding platoon		While disbanding a platoon, vehicles shall always keep optimal distance between them when on a transition between highways
	Growing platoon		Vehicles in a platoon shall always keep proper distance between them when a new vehicle joins the platoon on a transition between highways

	Shrinking platoon		Vehicles in a platoon shall always keep proper distance between them when a vehicle leaves their platoon on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall always keep proper distance between them when their platoon merges with another platoon on a transition between highways
	Splitting into two platoons		Vehicles in a platoon shall always keep proper distance between them when the platoon splits into two platoons on a transition between highways
Optimized inter-vehicular distance is not kept in some part of platoon	Platooning	Highway interchange	All vehicles in a platoon shall always keep optimal inter-vehicular distance when platooning on a transition between highways
	Forming platoon		While forming a platoon, all vehicles in the platoon shall always keep proper distance between them when on a transition between highways
	Disbanding platoon		While disbanding, all vehicles in the platoon shall always keep proper distance between them when on a transition between highways
	Growing platoon		All vehicles in a platoon shall always keep proper inter-vehicular distance when a new vehicle joins the platoon on a transition between highways
	Shrinking platoon		All vehicles in a platoon shall always keep optimal inter-vehicular distance when a vehicle leaves their platoon on a transition between highways
	Merging with other platoon		All vehicles in a platoon shall always keep proper inter-vehicular distance when their platoon merges with another platoon on a transition between highways
	Splitting into two platoons		All vehicles in a platoon shall always keep proper inter-vehicular distance when their platoon splits into two platoons on a transition between highways
Does not make place for a vehicle to join platoon	Platooning	Highway interchange	Vehicles in a platoon shall make place for a vehicle that wants to join the platoon on a transition between highways
	Forming platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon is forming on a transition between highways
	Growing platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon is growing on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall make place for a vehicle that wants to join the platoon when the platoon merges with another platoon on a transition between highways
More than optimal space is created for a vehicle to join platoon	Platooning	Highway interchange	Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon on a transition between highways
	Forming platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is forming on a transition between highways
	Growing platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is growing on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon merges with another platoon on a transition between highways
	Platooning	Highway interchange	Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon on a transition between highways

Less than optimal space is created for a vehicle to join platoon	Forming platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is forming on a transition between highways
	Growing platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon is growing on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall make optimal space for a vehicle that wants to join the platoon when the platoon merges with another platoon on a transition between highways
Only a part of the platoon (not all of the designated vehicles in the platoon) make place for a vehicle to join platoon	Platooning	Highway interchange	All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle on a transition between highways
	Forming platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle when the platoon is forming on a transition between highways
	Growing platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle when the platoon is growing on a transition between highways
	Merging with other platoon		All vehicles in a platoon that are responsible for joining a new vehicle shall make place for that vehicle when the platoon merges with another platoon on a transition between highways
Platoon decreases inter-vehicular distance when making place to join platoon (reverses of making a place - reducing space)	Platooning	Highway interchange	Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon on a transition between highways
	Forming platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon is forming on a transition between highways
	Growing platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon is growing on a transition between highways
	Merging with other platoon		Vehicles in a platoon shall not decrease their inter-vehicle distance when a vehicle wants to join the platoon while the platoon merges with another platoon on a transition between highways
Platoon breaks up when vehicle wants to join (other possible scenario while making place)	Platooning	Highway interchange	A platoon shall not be disbanded when a vehicle wants to join while platooning on a transition between highways
	Forming platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon is forming on a transition between highways
	Growing platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon is growing on a transition between highways
	Merging with other platoon		A platoon shall not be disbanded when a vehicle wants to join while the platoon merges with another platoon on a transition between highways
Platoon does not merge with other platoon when desired	Merging with other platoon	Highway interchange	A platoon shall always merge with another platoon when this is desired while on a transition between highways
Platoon merges with more than one platoon while it shall only be merging with one	Merging with other platoon	Highway interchange	A platoon shall always merge with only one other platoon while on a transition between highways
Only part of the platoon merges with another platoon while merging	Merging with other platoon	Highway interchange	A platoon shall always completely merge with another platoon during the merging process on a transition between highways

Another platoon merges with current platoon while the reverse is desired	Merging with other platoon	Highway interchange	Merger and mergee roles shall be properly conformed to between two platoons while the merge on a transition between highways
The platoon does not split when a split is desired	Splitting into two platoons	Highway interchange	A platoon shall always actually split into two platoons when this is desired while on a transition between highways
Platoon splits into more than two platoons	Splitting into two platoons	Highway interchange	A platoon shall always split into exactly two other platoons when splitting on a transition between highways
The platoon splits and merges into a platoon while only a split is desired	Splitting into two platoons	Highway interchange	A platoon shall never merge with another platoon while splitting on a transition between highways
After the split less than two platoons remain since the resulting platoons contain less than two vehicles	Splitting into two platoons	Highway interchange	A platoon shall always split into exactly two other platoons when splitting on a transition between highways
Leading vehicle is not changed while this is desired	Platooning	Highway interchange	The leader of a platoon shall always be changed when this is desired while platooning on a transition between highways
	Merging with other platoon		The leader of a merging platoon shall always be changed to a follower in the mergee platoon while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		The leader of a platoon shall be able to be changed if desired during the platoon splits into two platoons on a transition between highways
Multiple vehicles in a platoon are assigned leader role while only one vehicle shall	Platooning	Highway interchange	A platoon shall always have at most one leader while platooning on a transition between highways
	Merging with other platoon		A platoon shall always have one leader during and after merging with another platoon on a transition between highways
	Splitting into two platoons		Both platoons resulting from a platoon split shall have one leader each during and after splitting on a transition between highways
First follower is not assigned the leader role when the leader leaves a platoon	Platooning	Highway interchange	A platoon shall always have exactly one new leader when its current leader leaves while platooning on a transition between highways
	Merging with other platoon		A platoon shall always have exactly one new leader when the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		Both platoons resulting from a platoon split shall have one leader each during and after splitting on a transition between highways
Platoon breaks up when the leading vehicle is changed	Platooning	Highway interchange	A platoon shall not break up when the leading vehicle is being changed while platooning on a transition between highways
	Merging with other platoon	Highway interchange	A platoon shall not break up when the leading vehicle is being changed while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		A platoon shall not break up when the leading vehicle is being changed when a platoon splits into two platoons on a transition between highways

Platoon does not keep proper distance to surrounding vehicles	Platooning	Highway interchange	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on a transition between highways
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on a transition between highways
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on a transition between highways
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on a transition between highways
	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on a transition between highways
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on a transition between highways
Platoon keeps more than enough distance to surrounding vehicles	Platooning	Highway interchange	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on a transition between highways
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on a transition between highways
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on a transition between highways
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on a transition between highways
	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on a transition between highways
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on a transition between highways
Platoon keeps less than enough distance to surrounding vehicles	Platooning	Highway interchange	A platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on a transition between highways
	Forming platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on a transition between highways
	Disbanding platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on a transition between highways
	Growing platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on a transition between highways

	Shrinking platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on a transition between highways
	Merging with other platoon		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		A platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on a transition between highways
Only some of the vehicles in the platoon keep proper distance to surrounding vehicles	Platooning	Highway interchange	All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while platooning on a transition between highways
	Forming platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is forming on a transition between highways
	Disbanding platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is disbanding on a transition between highways
	Growing platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is growing on a transition between highways
	Shrinking platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon is shrinking on a transition between highways
	Merging with other platoon		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon merges with another platoon on a transition between highways
	Splitting into two platoons		All vehicles in a platoon shall always keep proper distance to vehicles surrounding the platoon while the platoon splits into two platoons on a transition between highways

## Hazardous events and goals from vehicular perspective

Hazard	Operational Mode	Operational Situation	Goal to prevent hazardous event
Not keeping proper distance to neighbouring vehicle(s) while driving autonomously inside of platoon	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall keep proper distance to neighbouring vehicles when they are following the vehicle in front of them autonomously
	Switch from follower to leader		Vehicles in a platoon shall keep proper distance to neighbouring vehicles when they transition from follower to leader
Keeping more than optimal (>2.0s) distance to neighbouring vehicles while driving autonomously inside of platoon	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall keep optimal distance to neighbouring vehicles when they are following the vehicle in front of them autonomously
	Switch from follower to leader		Vehicles in a platoon shall keep optimal distance to neighbouring vehicles when they transition from follower to leader
Keeping less than optimal (<0.3s) distance to neighbouring vehicles while driving autonomously inside platoon	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall keep optimal distance to neighbouring vehicles when they are following the vehicle in front of them autonomously
	Switch from follower to leader		Vehicles in a platoon shall keep optimal distance to neighbouring vehicles when they transition from follower to leader
Not keeping proper distance to some (part) of the neighbouring vehicles while driving autonomously inside platoon	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall keep proper distance to all neighbouring vehicles when they are following the vehicle in front of them autonomously
	Switch from follower to leader		Vehicles in a platoon shall keep proper distance to all neighbouring vehicles when they transition from follower to leader
Not driving autonomously inside of platoon	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall drive autonomously when they are following the vehicle in front of them
	Switch from follower to leader		Vehicles in a platoon shall drive autonomously during transition from follower to leader
Not driving manually while leading	Leader of platoon	Driving inside platoon	The leading vehicles in a platoon shall be controlled by the driver
	Switch from leader to follower		The leader vehicle in a platoon shall be controlled by the driver during its transition from leader to follower
Current vehicle taking leader role while another vehicle already leads the platoon	Leader of platoon	Driving inside platoon	A vehicle in a platoon shall not be leading the platoon while another vehicle is already in leader role
	Switch from leader to follower		No other vehicle in a platoon shall be transitioning from leader to follower the platoon while a vehicle is leading the platoon
Taking leader role while the current	Leader of platoon		A vehicle in a platoon shall be at the front of the platoon when it is the leader of the platoon

vehicle is (a part of the platoon) not the first (in the leader position) of platoon	Switch from leader to follower	Driving inside platoon	A vehicle shall be at the front of the platoon when it transition from leader to follower
Taking leader role while driving manually behind the platoon	Leader of platoon	Driving inside platoon	A vehicle in a platoon shall be at the front of the platoon when it is the leader of the platoon
	Switch from leader to follower		A vehicle shall be at the front of the platoon when it transition from leader to follower
Not taking the leader role when desired	Following vehicle in platoon	Driving inside platoon	A vehicle in a platoon shall become leader of the platoon when desired, given it is the first follower
	Switch from follower to leader		A vehicle in a platoon (first follower) shall be able to switch from follower to leader when desired
Taking both leader and follower role in a platoon at the same time	Following vehicle in platoon	Driving inside platoon	Vehicles in a platoon shall not take the role of leader while they are follower role (two roles at the same time not possible))
	Switch from follower to leader		A vehicle in a platoon shall not take on both the role of leader and the role of follower when it switches from follower to leader
Switching out of leader role when not desired	Following vehicle in platoon	Driving inside platoon	The leader vehicle in a platoon shall not lose its leader status when this is not desired
	Leader of platoon		The leader vehicle in a platoon shall not lose its leader status when this is not desired
	Switch from follower to leader		A leader vehicle in a platoon shall not lose its leader status at the same time it transition from follower to leader
Continue being leader of platoon when not desired	Leader of platoon	Driving inside platoon	A vehicles in a platoon shall be able to stop being a leader when this is desired
	Leader of platoon	Driving outside platoon	A vehicle shall be able to switch out of leader role when this is desired
	Switch from leader to follower	Driving inside platoon	A vehicles in a platoon shall be able to stop being a leader when this is desired
	Switch from leader to follower	Driving outside platoon	A vehicle shall be able to switch out of leader role when this is desired
Switch from leader role, but does not take follower role (only part of the complete role switch happens)	Leader of platoon	Driving inside platoon	The leader in a platoon shall be able to move out of the platoon to take follower role, when desired
	Leader of platoon	Driving outside platoon	When switching from leader to follower role, the vehicle shall be able to take follower role after relinquishing leader role
	Switch from leader to follower	Driving inside platoon	The leader in a platoon shall be able to move out of the platoon to take follower role, when desired
	Switch from leader to follower	Driving outside platoon	When switching from leader to follower role, the vehicle shall be able to take follower role after relinquishing leader role

Take leader role of platoon while not desired	Leader of platoon	Driving inside platoon	Any vehicle in a platoon shall not become the leader of the platoon when this is not desired
	Leader of platoon	Driving outside platoon	Vehicles outside of a platoon shall not become the leader of the platoon when this is not desired
	Switch from leader to follower	Driving inside platoon	Any vehicle in a platoon shall not become the leader of the platoon when this is not desired
	Switch from leader to follower	Driving outside platoon	Vehicles outside of a platoon shall not become the leader of the platoon when this is not desired
	Following vehicle in platoon	Driving inside platoon	Any vehicle in a platoon shall not become the leader of the platoon when this is not desired
Not being able to join platoon while desired	Joining platoon	Driving inside platoon	Vehicles shall be able to join a platoon when desired
Leave platoon instead of joining	Joining platoon	Driving inside platoon	Vehicles shall not leave a platoon when they are joining the platoon
Not being able to leave platoon	Leaving platoon	Driving inside platoon	Vehicles in a platoon shall be able to leave the platoon
Join platoon instead of leaving	Leaving platoon	Driving inside platoon	Vehicles in a platoon shall separate from the platoon formation when they are leaving the platoon and they at the same time shall no be joining the platoon (joining and leaving of a vehicle shall not happen at the same time))
Not reacting timely to actions of surrounding vehicles	Leader of platoon	Driving inside platoon	Vehicles in a platoon shall be able to timely react to actions of surrounding vehicles while they are leading
	Following vehicle in platoon		Vehicles in a platoon shall be able to timely react to actions of surrounding vehicles while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle in a platoon shall be able to timely react to actions of surrounding vehicles while it transition from follower to leader
	Switch from leader to follower		A vehicle in a platoon shall be able to timely react to actions of surrounding vehicles while it transition from leader to follower
React more (false positive) to actions of surrounding vehicles	Leader of platoon	Driving inside platoon	A vehicle's actions to surrounding vehicles shall not be false negative while it is leading
	Following vehicle in platoon		Vehicles' (followers') reactions to actions of surrounding vehicles shall not be false negatives while they are following the vehicle in front of them autonomously
	Switch from follower to leader		Vehicle's (follower's) reactions to actions of surrounding vehicles shall not be false negatives while it transition from follower to leader
	Switch from leader to follower		Vehicle's reactions to actions of surrounding vehicles shall not be false negatives while it transition from leader to follower
React less (not within timing constraints or false negatives) to actions of surrounding vehicles	Leader of platoon	Driving inside platoon	Leader in a platoon shall react timely to actions of surrounding vehicles
	Following vehicle in platoon		Vehicles in a platoon shall react timely to actions of surrounding vehicles while they are following the vehicle in front of them autonomously

	Switch from follower to leader		A vehicle in a platoon shall react timely to actions of surrounding vehicles while it transition from follower to leader
	Switch from leader to follower		A vehicle in a platoon shall react timely to actions of surrounding vehicles while it transition from leader to follower
Not properly (partly) reacting to actions of surrounding vehicles (because of incorrect vehicle dynamics inputs)	Leader of platoon	Driving inside platoon	A vehicle in a platoon shall react to actions of surrounding vehicles according to its vehicle dynamics while it is leading
	Following vehicle in platoon		Vehicles in a platoon shall react to actions of surrounding vehicles according to their vehicle dynamics while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle in a platoon shall react to actions of surrounding vehicles according to its vehicle dynamics while it transition from follower to leader
	Switch from leader to follower		A vehicle in a platoon shall react to actions of surrounding vehicles according to its vehicle dynamics while it transition from leader to follower
React to actions of vehicles outside the platoon as if they are part of platoon	Leader of platoon	Driving inside platoon	Leader of a platoon shall differentiate vehicles inside platoon and out side platoon
	Following vehicle in platoon		Vehicles (followers) of a platoon shall differentiate vehicles inside platoon and out side the platoon
	Switch from follower to leader		A vehicle of a platoon shall differentiate vehicles inside platoon and out side platoon while it transitions from follower to leader
	Switch from leader to follower		A vehicle of a platoon shall differentiate vehicles inside platoon and out side platoon while it transitions from leader to follower
Not following traffic indications, signs and rules	Joining platoon	Driving outside platoon	A vehicle joining a platoon shall follow traffic indications, signs and rules while joining the platoon
	Leaving platoon		A vehicle leaving a platoon shall follow traffic indications, signs and rules while leaving the platoon
	Leader of platoon		The leader of platoon shall follow traffic indications, signs and rules
	Following vehicle in platoon		Vehicles (followers) in a platoon shall follow traffic indications, signs and rules
	Switch from follower to leader		A vehicle in a platoon shall follow traffic indications, signs and rules while it transitions from follower to leader
	Switch from leader to follower		A vehicle in a platoon shall follow traffic indications, signs and rules while it transitions from leader to follower
	Joining platoon	Driving inside platoon	A vehicle shall follow traffic indications, signs and rules while joining a platoon
	Leaving platoon		A vehicle shall follow traffic indications, signs and rules while leaving a platoon
	Leader of platoon		A vehicle shall follow traffic indications, signs and rules while being the leader of a platoon
	Following vehicle in platoon		Vehicles in a platoon shall follow traffic indications, signs and rules while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle in a platoon shall follow traffic indications, signs and rules while it transition from follower to leader

	Switch from leader to follower		A vehicle in a platoon shall follow traffic indications, signs and rules while it transitions from leader to follower
Only follow some of the traffic indications, signs and rules	Joining platoon	Driving outside platoon	A vehicle shall precisely and completely follow traffic indications, signs and rules while joining a platoon
	Leaving platoon		A vehicles shall precisely and completely follow traffic indications, signs and rules while leaving a platoon
	Leader of platoon		A vehicles shall precisely and completely follow traffic indications, signs and rules while being the leader of a platoon
	Following vehicle in platoon		A vehicles shall precisely and completely follow traffic indications, signs and rules while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicles shall precisely and completely follow traffic indications, signs and rules while they transition from follower to leader
	Switch from leader to follower		A vehicles shall precisely and completely follow traffic indications, signs and rules while they transition from leader to follower
	Joining platoon	Driving inside platoon	A vehicle shall precisely and completely follow traffic indications, signs and rules while joining a platoon
	Leaving platoon		A vehicle shall precisely and completely follow traffic indications, signs and rules while leaving a platoon
	Leader of platoon		A vehicle shall precisely and completely follow traffic indications, signs and rules while being the leader of a platoon
	Following vehicle in platoon		A vehicle shall precisely and completely follow traffic indications, signs and rules while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle shall precisely and completely follow traffic indications, signs and rules while they transition from follower to leader
	Switch from leader to follower		A vehicle shall precisely and completely follow traffic indications, signs and rules while they transition from leader to follower
Not following all traffic indications, signs and rules	Joining platoon	Driving outside platoon	A vehicle shall follow all traffic indications, signs and rules while joining a platoon
	Leaving platoon		A vehicle shall follow all traffic indications, signs and rules while leaving a platoon
	Leader of platoon		A vehicle shall follow all traffic indications, signs and rules while being the leader of a platoon
	Following vehicle in platoon		A vehicle shall follow all traffic indications, signs and rules while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle shall follow all traffic indications, signs and rules while they transition from follower to leader
	Switch from leader to follower		A vehicle shall follow all traffic indications, signs and rules while they transition from leader to follower
	Joining platoon	Driving inside platoon	A vehicle shall follow all traffic indications, signs and rules while joining a platoon
	Leaving platoon		A vehicle shall follow all traffic indications, signs and rules while leaving a platoon
	Leader of platoon		A vehicle shall follow all traffic indications, signs and rules while being the leader of a platoon

	Following vehicle in platoon		A vehicle shall follow all traffic indications, signs and rules while they are following the vehicle in front of them autonomously
	Switch from follower to leader		A vehicle shall follow all traffic indications, signs and rules while they transition from follower to leader
	Switch from leader to follower		A vehicle shall follow all traffic indications, signs and rules while they transition from leader to follower
Following traffic indications, signs , and rules from a different region	Joining platoon	Driving outside platoon	A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while joining a platoon
	Leaving platoon		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while leaving a platoon
	Leader of platoon		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while being the leader of a platoon
	Following vehicle in platoon		<del>A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they are following the vehicle in front of them autonomously</del>
	Switch from follower to leader		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they transition from follower to leader
	Switch from leader to follower		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they transition from leader to follower
	Joining platoon	Driving inside platoon	A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while joining a platoon
	Leaving platoon		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while leaving a platoon
	Leader of platoon		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while being the leader of a platoon
	Following vehicle in platoon		<del>A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they are following the vehicle in front of them autonomously</del>
	Switch from follower to leader		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they transition from follower to leader
	Switch from leader to follower		A vehicle shall follow traffic indications, signs and rules from the region the vehicle is in, while they transition from leader to follower
Does not follow vehicle in front when desired	Joining platoon	Driving outside platoon	A vehicle shall follow the vehicle in front of them while joining the platoon
	Leaving platoon		A vehicle shall follow the vehicle in front of them while leaving the platoon
	Following vehicle in platoon		A vehicle shall follow the vehicle in front of them while following a vehicle inside of the platoon
	Switch from follower to leader		Vehicles (followers) shall follow the vehicle in front of them while the first follower transition to leader
	Switch from leader to follower		The rest of the vehicles in the platoon (except current leader) shall follow the vehicle in front of them while they transition from leader to follower
	Joining platoon		Vehicles (followers) in a platoon shall follow the vehicle in front of them while a vehicle joins the platoon

	Leaving platoon	Driving inside platoon	Vehicles (followers) in a platoon shall follow the vehicle in front of them while a vehicle leaves the platoon
	Following vehicle in platoon		Vehicles (followers) in a platoon shall follow the vehicle in front of them while in platooning mode
	Switch from follower to leader		Vehicles (followers) in a platoon shall follow the vehicle in front of them while a vehicle transition from follower to leader
	Switch from leader to follower		Vehicles (followers) in a platoon shall follow the vehicle in front of them while a vehicle transition from leader to follower
Follow more than one vehicle in front	Joining platoon	Driving outside platoon	Each follower in a platoon shall follow exactly one vehicle (the leader/follower in front of them) in front of them at a time, while a vehicle joins the platoon
	Leaving platoon		Each follower in a platoon shall follow exactly one vehicle (the leader/follower in front of them) in front of them at a time, while a vehicle leaves the platoon
	Following vehicle in platoon		Each follower in a platoon shall follow exactly one vehicle (the leader/follower in front of them) in front of them at a time, during platooning mode
	Switch from follower to leader		Each follower in a platoon shall follow exactly one vehicle (the leader/follower in front of them) in front of them at a time, while a vehicle transition from follower to leader
	Switch from leader to follower		Each follower in a platoon shall follow exactly one vehicle (the leader/follower in front of them) in front of them at a time, while a vehicle transition from leader to follower
	Joining platoon	Driving inside platoon	Each follower in a platoon shall follow only one vehicle in front of them at a time, while a vehicle joins the platoon
	Leaving platoon		Each follower in a platoon shall follow only one vehicle in front of them at a time, while a vehicle leaves the platoon
	Following vehicle in platoon		Each follower in a platoon shall follow only one vehicle in front of them at a time, in platooning mode
	Switch from follower to leader		Each follower in a platoon shall follow only one vehicle in front of them at a time, while a vehicle transitions from follower to leader
	Switch from leader to follower		Each follower in a platoon shall follow only one vehicle in front of them at a time, while a vehicle transitions from leader to follower
Following a different vehicle than the vehicle in front	Joining platoon	Driving outside platoon	Each vehicle in a platoon shall always follow the vehicle directly in front of them while a vehicle joins the platoon
	Leaving platoon		Each vehicle in a platoon shall always follow the vehicle directly in front of them while a vehicle leaves the platoon
	Following vehicle in platoon		Each vehicle in a platoon shall always follow the vehicle directly in front of them in platooning mode
	Switch from follower to leader		Each vehicle in a platoon shall always follow the vehicle directly in front of them while a vehicle transitions from follower to leader
	Switch from leader to follower		Each vehicle in a platoon shall always follow the vehicle directly in front of them while a vehicle transitions from leader to follower
	Joining platoon		Each follower in a platoon shall always follow the vehicle directly in front of them while a vehicle joins the platoon

	Leaving platoon	Driving inside platoon	Each follower in a platoon shall always follow the vehicle directly in front of them while a vehicle leaves the platoon
	Following vehicle in platoon		Each follower in a platoon shall always follow the vehicle directly in front of them in platooning mode
	Switch from follower to leader		Each follower in a platoon shall always follow the vehicle directly in front of them while a vehicle transitions from follower to leader
	Switch from leader to follower		Each follower in a platoon shall always follow the vehicle directly in front of them while a vehicle transitions from leader to follower