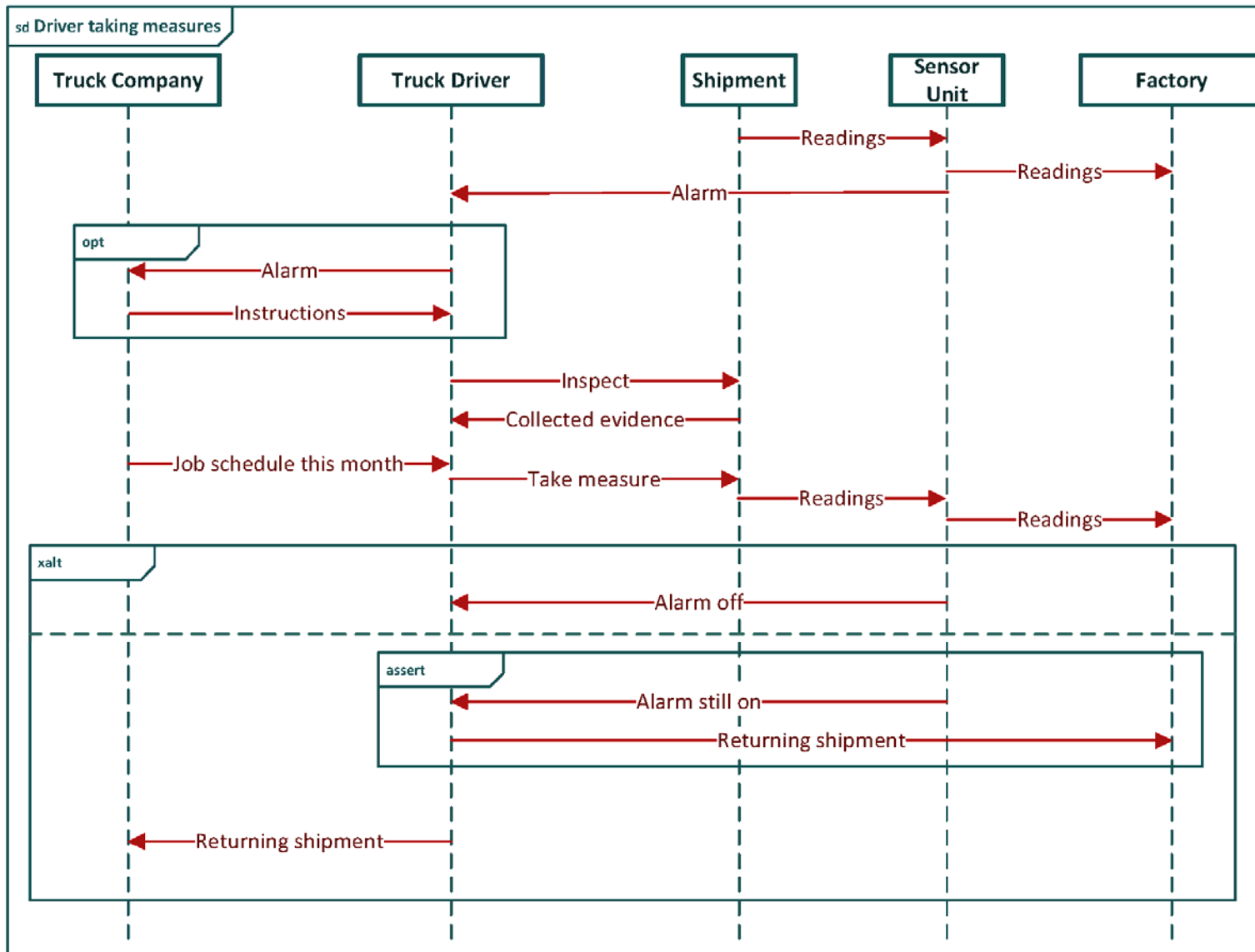
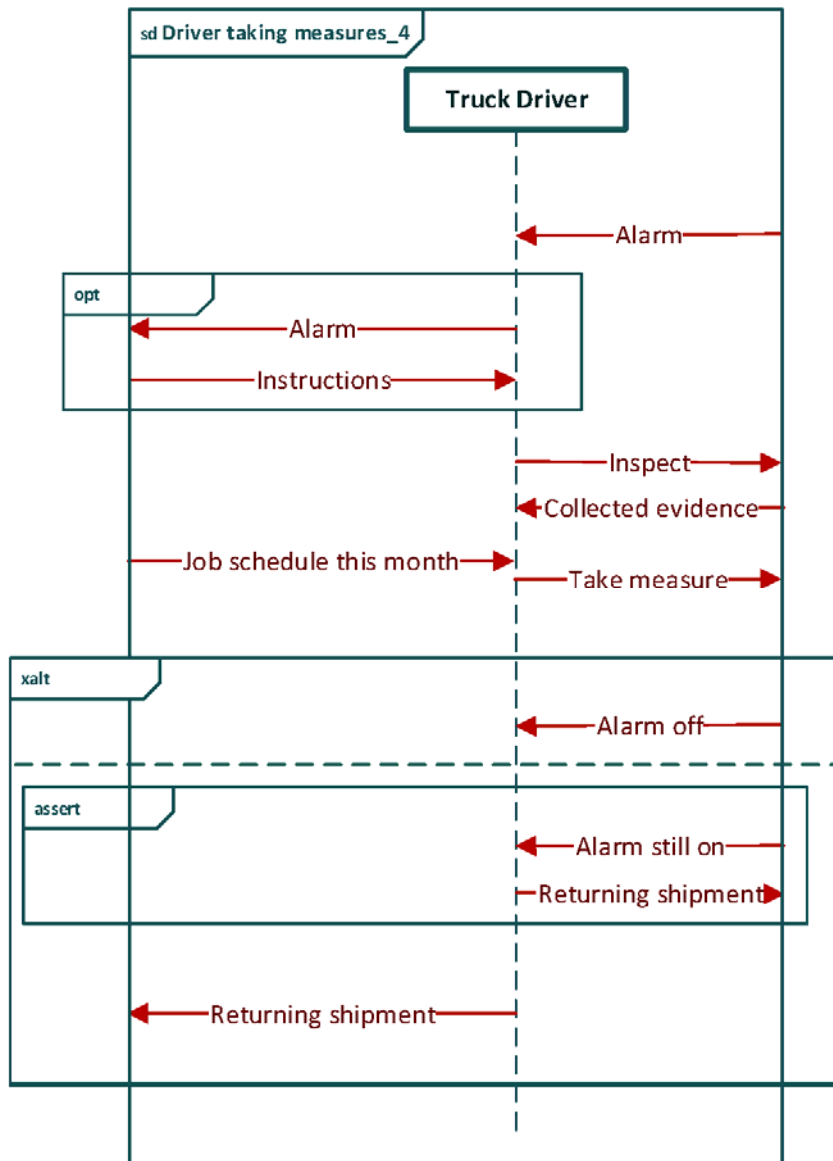


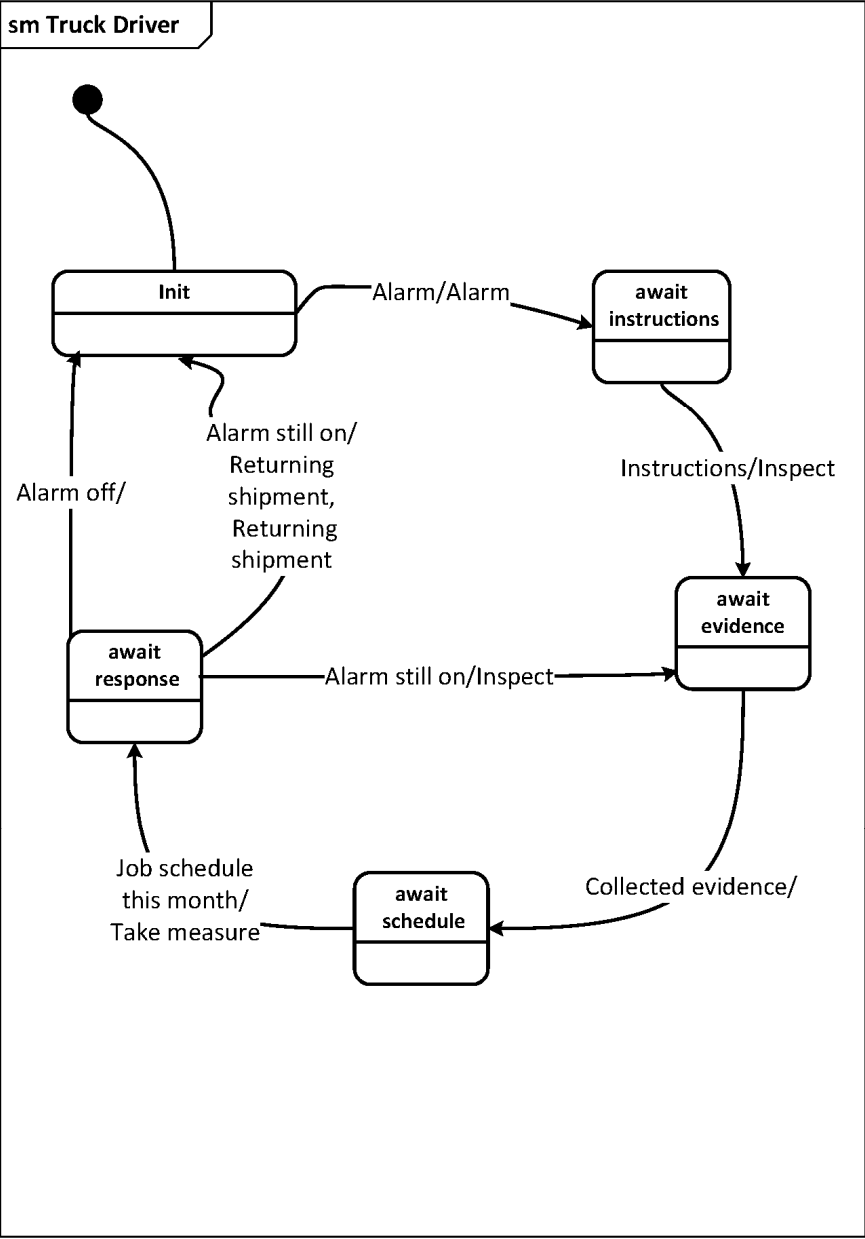
A composite background image showing a snowy mountain range, a city skyline, wind turbines, and an offshore oil rig in the sea. A semi-transparent white box is overlaid on the center of the image.

OBLIG-II REFINEMENT

- The solution-paper in the form of a single pdf-document should be sent to kst@sintef.no by midnight October 22. You may work in groups of maximum three students or you may work alone. Hence, one solution may have up to three names. There should be no collaboration or copying between different groups. Hence, each group should solve the exercise independently.
- **Remember to put your real names (not usernames) in the solution-paper so that I can see who wrote it when it is printed on paper.**







Question 1

Question 1a

- What is the length of the shortest positive trace in the sequence diagram **Driver taking measures**? Explain your answer.

Question 1b

- What is the length of the shortest negative trace in the sequence diagram **Driver taking measures**? Explain your answer.

Question 1c

- Which events may occur as the first event in a positive trace of the sequence diagram **Driver taking measures**? Explain your answer.

Question 1d

- Which events may occur as the first event in a negative trace of the sequence diagram **Driver taking measures**? Explain your answer.

Question 1e

- Which events may occur as the last event in a positive trace of the sequence diagram **Driver taking measures**? Explain your answer.

Question 1f

- Which events may occur as the last event in a negative trace of the sequence diagram **Driver taking measures**? Explain your answer.

Question 2

Question 2a

- Let **Driver taking measures_1** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **veto**. Is **Driver taking measures_1** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Question 2b

- Let **Driver taking measures_2** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **assert**. Is **Driver taking measures_2** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Question 2c

- Let **Driver taking measures_3** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **loop**. Is **Driver taking measures_3** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Question 2d

- The state machine **Truck driver** does not allow all positive traces with respect to the lifeline Truck Driver in the sequence diagram **Driver taking measures**. Explain in detail how you would extend the state machine **Truck driver** with a new transition (or new transitions) so that every positive trace with respect to the lifeline Truck Driver in the sequence diagram **Driver taking measures** is allowed by your extended state machine **Truck driver_1**.

Question 2e

- Assume you have successfully accomplished the previous **Question 2d**. Is the resulting state machine **Truck driver_1** a refinement of the sequence diagram **Driver taking measures_4**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Question 2f

- Explain in detail how to modify the sequence diagram **Driver taking measures** into a sequence diagram **Driver taking measures_5** that is a general refinement of the sequence diagram **Driver taking measure** but not a limited refinement of the sequence diagram **Driver taking measures**.



Teknologi for et bedre samfunn