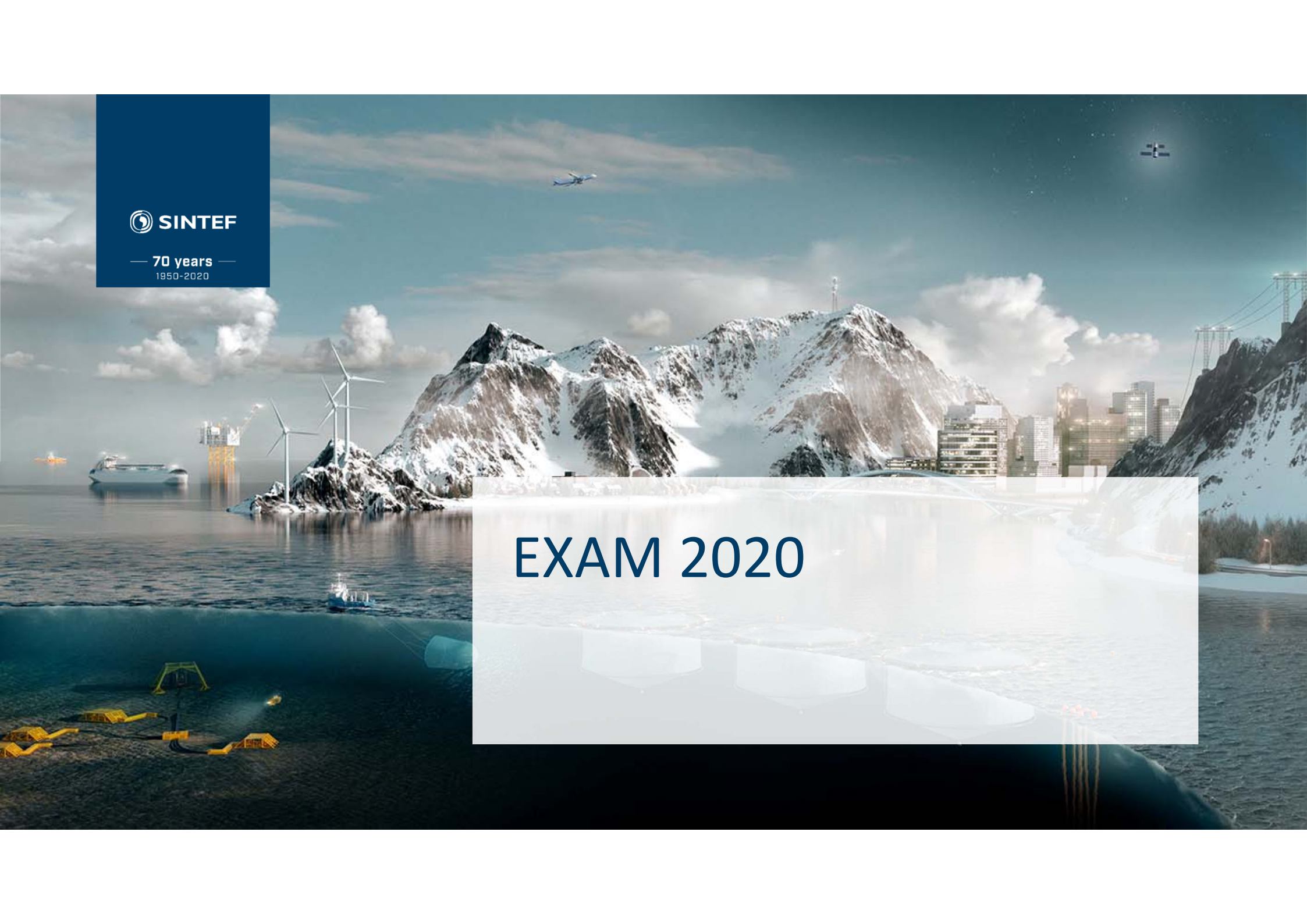




— 70 years —
1950-2020

A composite background image featuring a snowy mountain range. In the foreground, there are wind turbines on a rocky outcrop. To the left, a large ship is in the water, and a smaller boat is further out. In the background, a city skyline is visible, and a satellite is in orbit in the sky.

EXAM 2020

Answers Question 1

- a) !Model
- b) <>, 10 traces of length 14 corresponding to executing second alt operand once, 4 traces corresponding to execution first alt operand 1, 2, 3 or 4 times. This gives 15 traces.
- c) ?Model if loop executes 0 times, ?Nok if loop executes first alt operand in last iteration, ?Result if loop executes second alt operand in last execution.
- d) #N16 is greater than #P16. We get 15 traces if Analyzer receives ?Model before loop is initiated. We get additional traces otherwise.

Answers to Question 2

- a) !Model
- b) 1 trace of length 1, 2 traces of length 2, 2 traces of length 3 terminating in Iterate, 3 traces of length 3 terminating in Await report. Hence, $1+2+2+3=8$ traces.
- c) Infinitely many.

Answers to Question 3

- a) The alternative is an abstraction of an if-then-else. We want both options. Hence, it should be xalt.
- b) It is not a refinement since for both interaction obligations representing GestaltService1 there are inconclusive traces that are positive or negative in the obligation representing GestaltService0.

Answers to Question 4

- a) There are $2*4*8=64$ interaction obligations. Remember that the choice between looping 1, 2 or 3 times corresponds to an alt in which case we have to do inter union.
- b) It is a general refinement, but not a limited refinement.

Answers to Question 5

- a. 0
- b. Infinite.
- c. It is a limited refinement.

Answers to Question 6

- a. reputation of service (obvious), accountability of service (can be used to cast blame in case of incident), correctness of service (obvious)
- b. The values must have a meaning in natural language that reflects the ordering and the asset in question. The definitions must be precise and exploit the power of natural language reflect the asset in question, should not "overlap", should cover full "sample space".
- c. May for example measure "average number of misunderstandings per year". If interval scale is suggested: The values must have a meaning in natural language that reflects the ordering and the asset in question. The definitions must address the asset in question, should not "overlap", should cover full "sample space".
- d. Should contain threat, threat scenario, unwanted incident, asset. Vulnerabilities on each leads-to and initiate relation. Important that the natural language text makes sense. Example: Attack on gestalt service to steal models of UML Modelling customers.
- e. As for previous question. Example: Employee of UML Modelling by accident making critical report received from Gestalt Service public about model made for large customer.



— 70 år —
1950-2020

Teknologi for et bedre samfunn