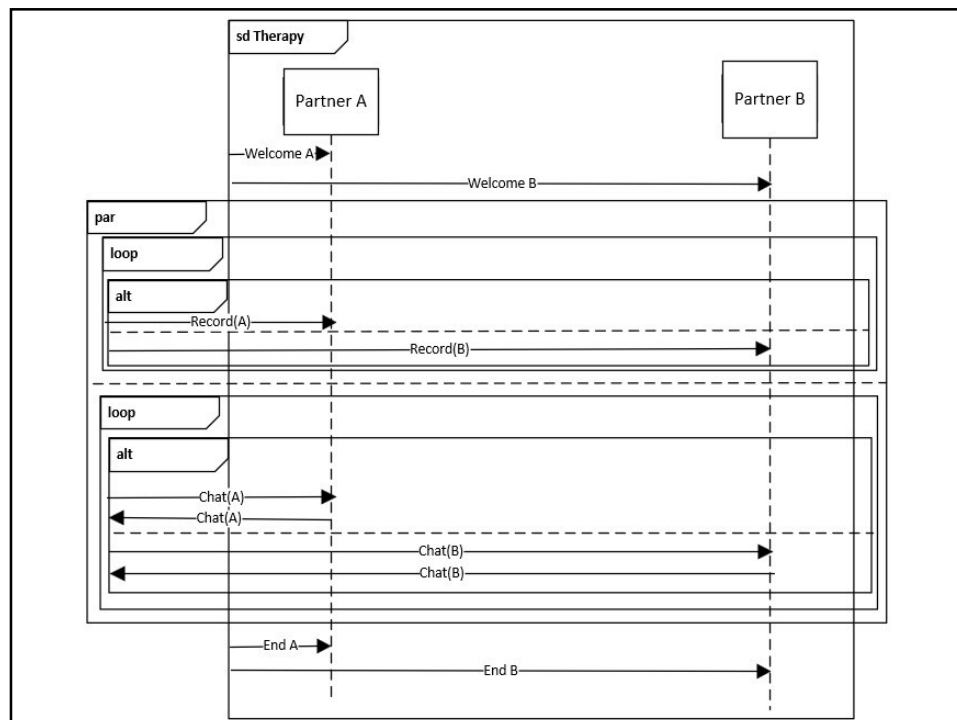


Exam 2023

Ketil Stølen

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Question 1

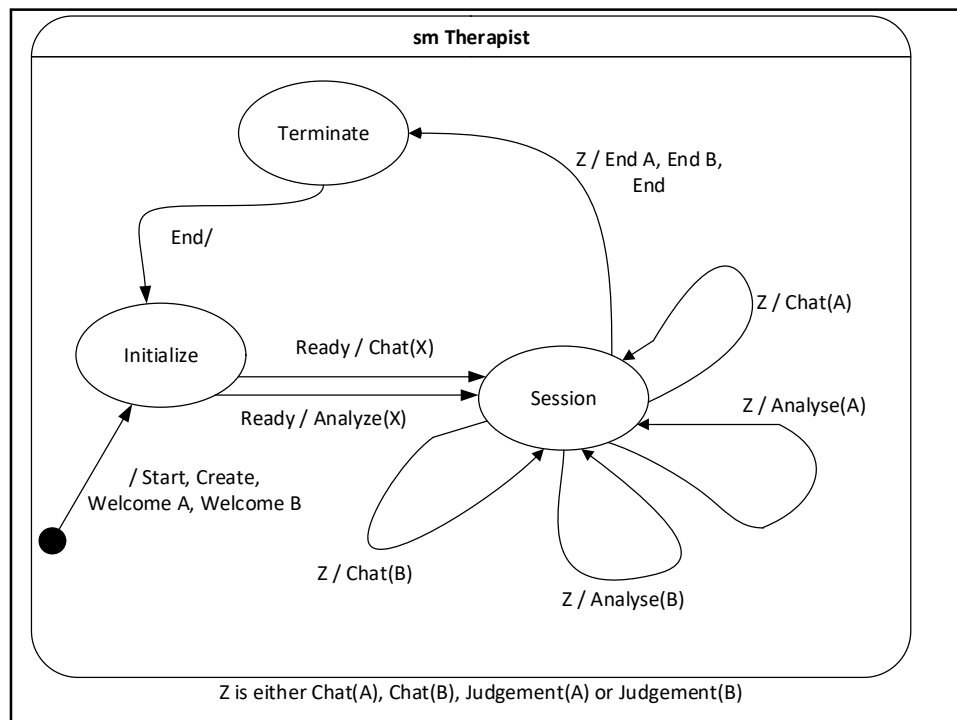
- a: Which events may occur as the first event in a positive trace of sd Therapy? Explain your answer.
- b: Which events may occur as the last event in a negative trace of sd Therapy? Explain your answer.
- c: Which events may occur as the second event in a positive trace of sd Therapy? Explain your answer.
- d: Which events may occur as the first event in an inconclusive trace of sd Therapy? Explain your answer.
- e: What is the length of the shortest positive trace of sd Therapy? Explain your answer.

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Answers Question 1

- a: ?Welcome A, ?Welcome B
- b: None. There are no negative traces.
- c: ?Welcome A, ?Welcome B, ?Record A, ?Record B, ?Chat A, ?Chat B, ?End A, ?End B
- d: Any event
- e: 4

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Question 2

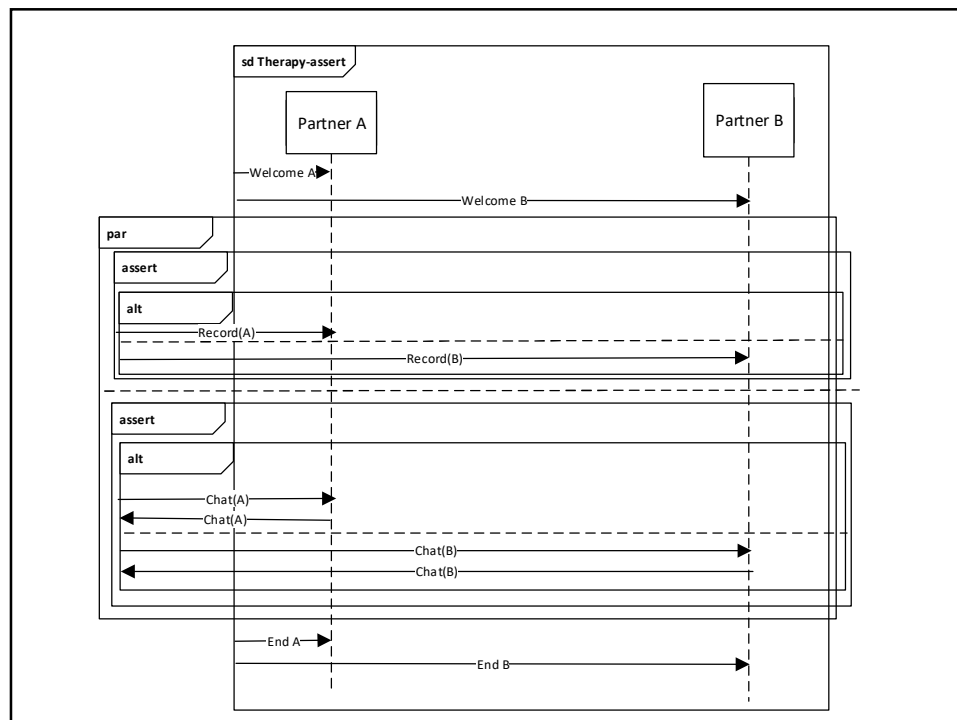
- What is the length of the shortest positive trace of **sm Therapist**? Explain your answer.
- What is the length of the shortest inconclusive trace of **sm Therapist**? Explain your answer.
- What is the length of the shortest negative trace of **sm Therapist**? Explain your answer.
- Is the trace `<!Start, !Create, !Welcome A, !Welcome B, ?Not Ready>` positive, negative or inconclusive with respect to **sm Therapist**? Explain your answer.
- Is the trace `<!Start, !Create, !Welcome A, !Welcome B, ?Ready>` positive, negative or inconclusive with respect to **sm Therapist**? Explain your answer.

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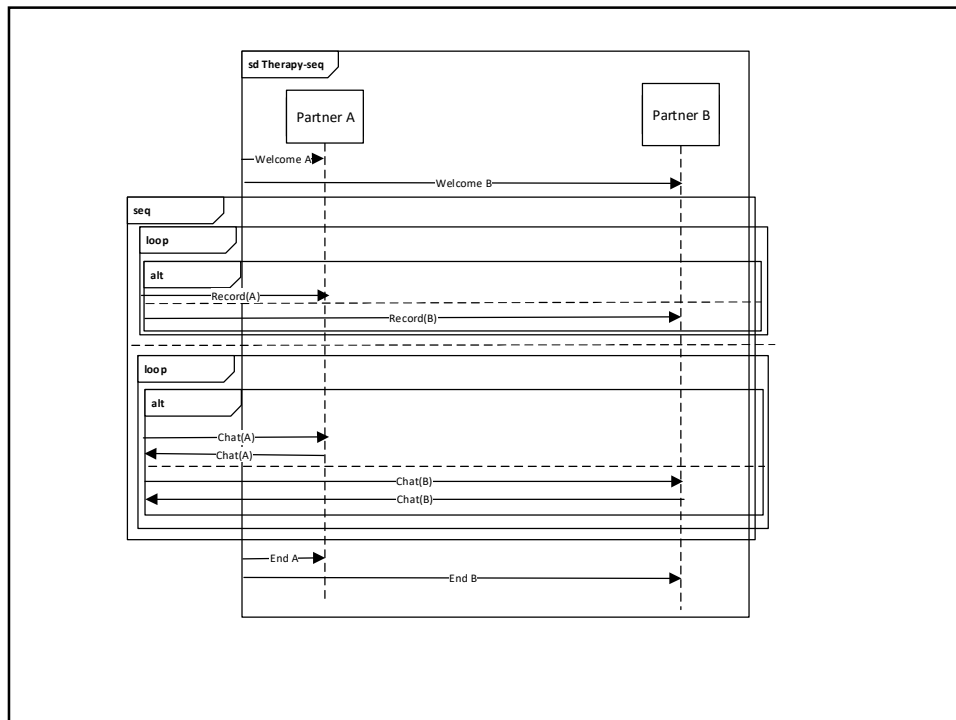
Answers Question 2

- a: 4
- b: There are no inconclusive traces
- c: 0
- d: Positive
- e: Negative

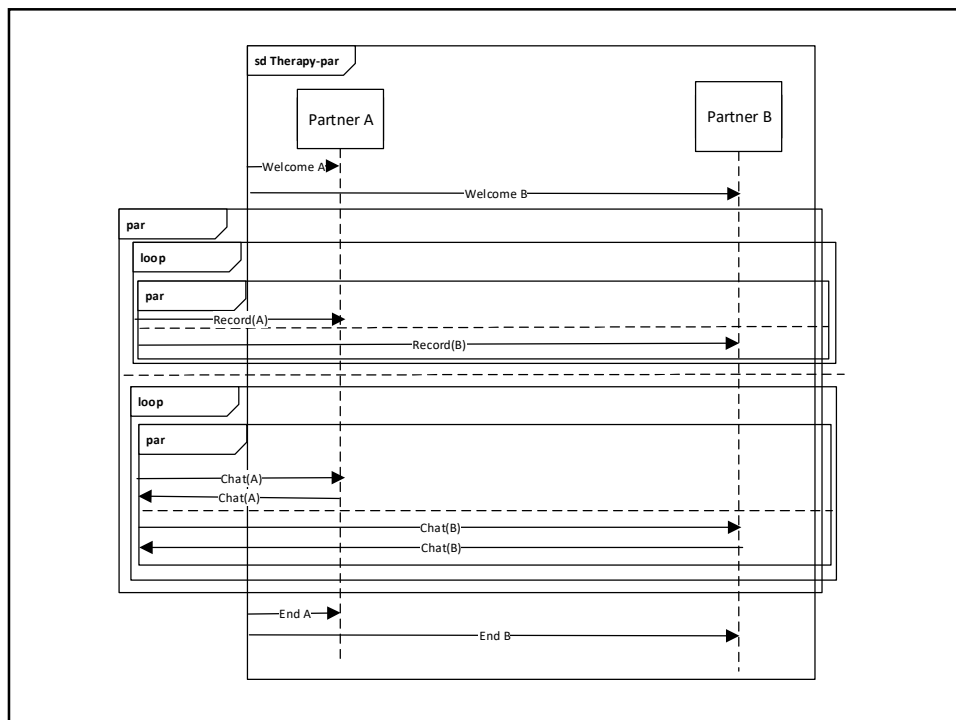
7



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Question 3

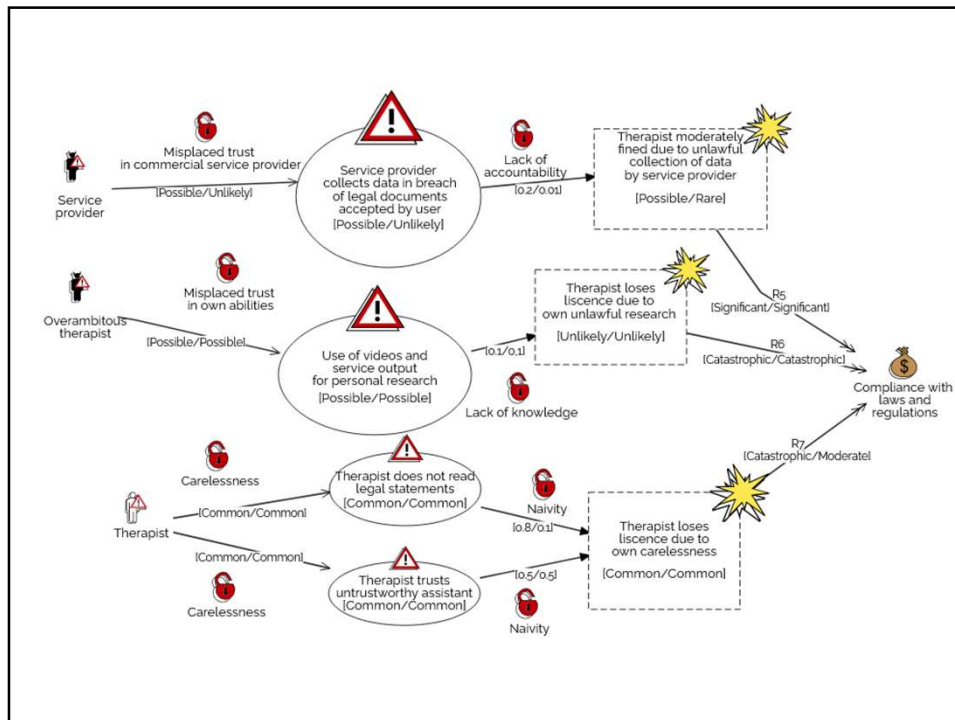
- a: Is sd Therapy-assert a refinement of sd Therapy? If so, what kind (narrowing/supplementing/both). Explain your answer.
- b: Can sd Therapy-seq and sd Therapy be related by refinement in one way or another? If so, what kind (narrowing/supplementing/both). Explain your answer.
- c: Is sd Therapy-par a refinement of sd Therapy? If so, what kind (narrowing/supplementing/both)? Explain your answer.
- d: Explain how sd Therapy can be changed into sd Therapy-general so that sd Therapy-general is a general refinement of sd Therapy but not a limited refinement.

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Answers Question 3

- a: Yes, one iteration remains positive, the rest becomes negative. That's narrowing, but also other traces become negative and that's supplementing.
- b: sd Therapy is a pure supplementing sd Therapy-seq since seq represents one interleaving option.
- c: No. Traces corresponding to looping once and executing one alt option have for example become inconclusive.
- d: Make a diagram with xalt as main construct and put sd Therapy inside the first option. Make sure that the content of the second option is not a refinement of Therapy.

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Frequency value	Intervals of average frequency
Common	<12:1y,∞:1y]
Likely	<1:1y, 12:1y]
Possible	<0.1:1y,1:1y]
Unlikely	<0.01:1y,0.1:1y]
Rare	[0:1y,0.01:1y]

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Question 4

- a: How many risks are present in the before state? Explain your answer.
- b: How would you alter the threat diagram so that it is consistent in the before state only if it is incomplete? Explain your answer.
- c: How would you alter the threat diagram so that it is inconsistent in the after state independent of whether it is complete or not? Explain your answer.
- d: Assume we are asked to also assess the risk to privacy on behalf of a customer couple. To what extent can the threat diagram be reused? Explain your answer.
- e: Assume the threat diagram is complete and correct. What can we conclude about the frequency of the combined unwanted incident **Therapist moderately fined due to unlawful collection of data by service provider OR Therapist loses license due to own unlawful research** in the after state?
- f: Assume the threat diagram is complete and correct. What can we conclude about the yearly loss with respect to the asset **Compliance with laws and regulations** in the after state given that moderate, significant and catastrophic are replaced by 100, 5000, 1 000 000 EURO?

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Answers Question 4

- a: 3
- b: Increase the before frequency in at least one unwanted incident/threat scenario to be higher than it should be based on what is leading up to it
- c: Lower the after frequency in at least one unwanted incident/threat scenario to be lower than it should be based on what is leading up to it
- d: The threat scenarios and what leads up to them are still highly relevant. The rest is no longer of value.
- e: The incidents are separate, and the frequencies can be added. This gives $<0.01:1y, 0.11:1y]$
- f: Lower value $((0*5000)+(0.01*1000000)+(12*100))=11200$
Upper value $((0.01*5000)+(0.1*1000000)+(\infty*100))=\infty$

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