i Introduction

Written exam IN5140/IN9140 2022 AUTUMN Duration: 28.11, 09:00-13:30

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No examination support material is allowed.

This exam set is only available in English. You may answer in Norwegian or English.

In this exam, you are permitted to make drawings/use sketching for Task 4.1. You are to use the sketching paper handed to you in the exam room. You can use more than one sketching sheet per task. See link to instructions for filling out sketching sheets near the bottom of your screen.

You may NOT hand in sketching sheets for any other tasks than Task 4.1. You will NOT be given extra time to fill out the "general information" on the sketching sheets (task codes, candidate number, etc.).

Good luck!

The exam is divided into the following four sections:

- Section 1: Multiple Choice questions (10%)
- Section 2: Various question types (16%)
- Section 3: Text answers (31%)
- Section 4: Case (43%)

i Section 1 - Intro

Section 1: Multiple Choice questions

This section contains 5 multiple choice questions where one answer is correct.

- Each correct answer is rewarded with 2 points
- Each wrong answer gives 0 points
- A total of 10 points is achievable in Section 1

1.1 PDCA

	Based on PDCA (Plan, Do, Check, Act), which step best describes "implenting improvement"? Select one alternative:	nent for further
	○ Check	
	○ Do	
	O Act	
	○ Plan	
		Maximum marks: 2
1.2	Scrum practices	
	Which of the following is NOT a Scrum practice? Select one alternative:	
	Backlog Grooming	
	O Daily Planning	
	O Daily Standup	
	O Daily Scrum	
		Maximum marks: 2

^{1.3} Agile

1.4

Which one of these statements is wrong ? Select one alternative:
Kanban focuses on iterations called Work-In-Progress
Agile development is both incremental and iterative
○ In Kanban a task should be finished as soon as possible
Scrum focuses on iterations called Sprints
Maximum marks: 2
Technical Debt
Select the correct statement regarding Technical Debt Select one alternative:
The principal of Technical Debt is its the negative impact
All Technical Debt should be adressed
The interest of Technical Debt is the cost of removing it
 The average waste generated by Technical Debt is around 30% of the development time
Maximum marks: 2

1.5 BPMN Syntax

In BPMN, a Choreography Task represents...

Select one alternative:

...a set of Participants of the same kind

...a task marked with the "User Task" symbol

...a connection between Conversations and Participants

...an Interaction (Message Exchange) between two Participants

Maximum marks: 2

i Section 2 - Intro

Section 2: Various question types

This section contains 6 multiple choice questions where several answers might be correct.

- The questions type varies.
- Each task describes number of achievable points for that task.
- A total of 16 points is achievable in Section 2.

^{2.1} Magic Triangle

What are the three dimensions of the Magic Triangle?

'2 points if all the three correct ones are chosen, 0 points if not). Select the three correct alternatives:
☐ Technical debt
☐ Effort (Cost)
Lean
Skill
☐ Quality and Scope
☐ Process debt
☐ Social debt
☐ Time
☐ Agile

^{2.2} Roles in Scrum

Select the three roles in a Scrum Team as describes by the Scrum f (2 points if all the three correct ones are chosen, 0 points if not). Select the three correct alternatives:	ramework:
☐ Product Owner	
☐ Scrum Master	
☐ Team Leader	
☐ Business analyst	
☐ Stakeholder	
Development Team	
	Maximum marks: 2

2.3 Types of Debt

Select the correct answer from the drop-down menus.

1 point for each correct answer, 1 bonus point if all questions are answered correctly.

Task A

Which type of debt best describes "the presence of sub-optimality in the development community, which causes a negative effect"?

Answer here:	Select alternative	(Social Debt, Process Debt, Technical Debt)
Task B Technical debt	is always negative	
Answer here:	Select alternative	(True, False)
Task C Technical debt	can be a bi-product o	of Social debt?

Task D

Answer here:

Which type of debt (technical, social or process) is the most important to address?

Select alternative (True, False)

Answer here:	Select alternative	(It depends, Process debt, Technical debt, Social debt)

^{2.4} Types of data

Select whether the following statements are true or false regarding data types.

1 point for each correct answer, 1 bonus point if all questions are answered correctly.

Task A Objective data can be quantitative. Select an alternative
○ True
○ False
Task B Subjective data can be quantitative. Select one alternative:
○ True
○ False
Task C Subjective data on something relevant is more important than objective data on irrelevant aspects. Select an alternative
○ True
○ False
Maximum marks: 4

^{2.5} CMMI (Capability Maturity Model Integrated)

Finish the sentences below regarding CMMI (Capability Maturity Model Integrated), so that they are correct.

1 point for each correct answer, 1 bonus point if both are answered correctly.

Drag answer and drop in answer	werfield	Help
Level 1 - Performed	Level 2 - Managed	
Level 3 - Defined	Level 4 - Quantitatively Managed	
Level 5 - Optimizing		
Task A		
A measured and controlled pr	rocess is:	•
Task B An <i>unpredictable and</i>		
poor process is:		
		Maximum marks: 3

i Section 3 - Intro

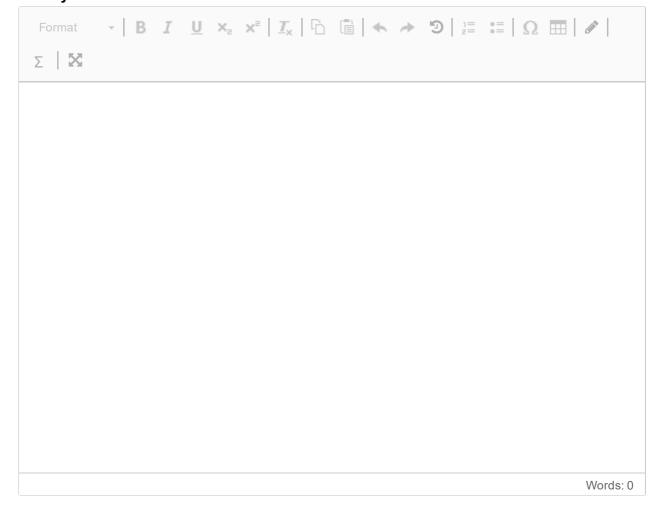
Section 3: Text answers

This section contains various questions from the curriculum. 31 points is achievable in this section.

3.1 Scrum-ish

Briefly explain the abbreviation "Scrum-ish". (4p)

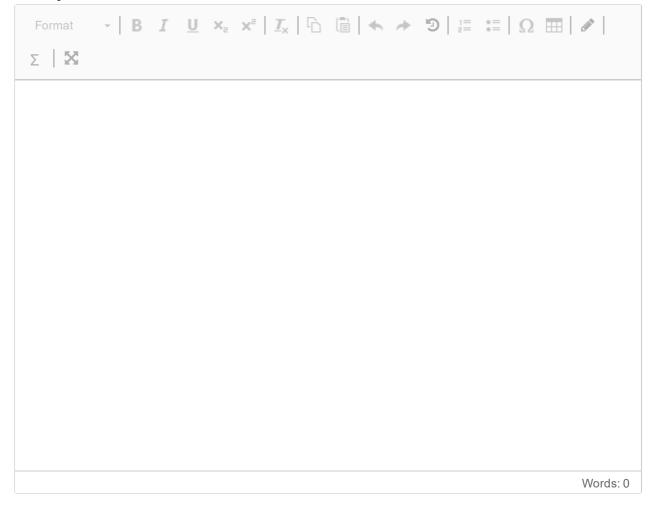
Fill in your answer here



3.2 Measurements in Software

Elaborate on some factors that can be measured in Software. (4p)

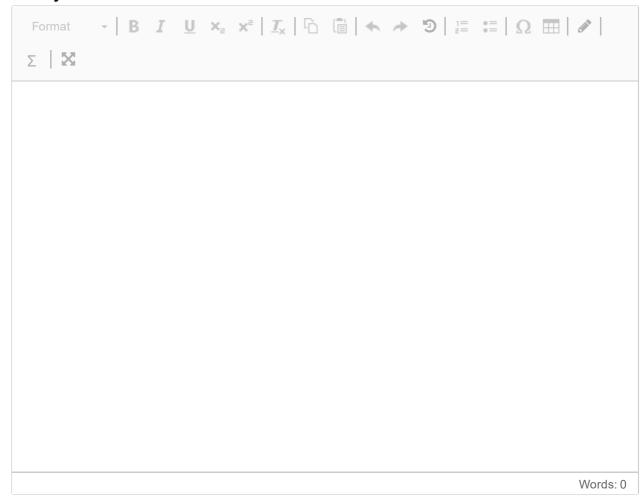
Fill in your answer here



3.3 Empirical studies

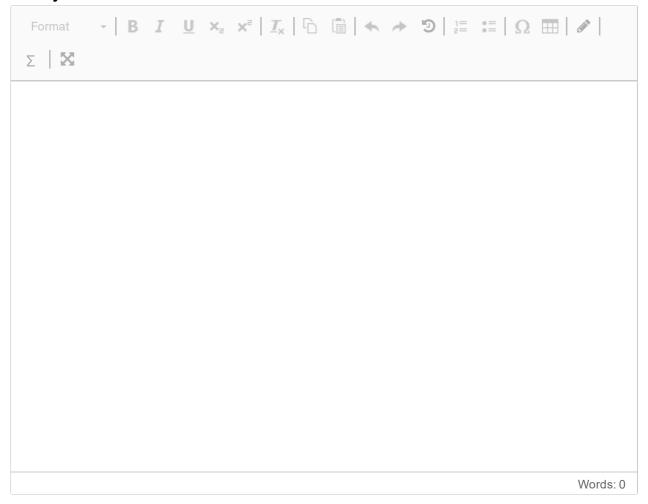
Briefly explain the difference between reliability and validity of empirical studies. (4p)

Fill in your answer here



3.4 Team compositions

Briefly explain the differences between "component teams" and "feature teams". (4p) **Fill in your answer here**

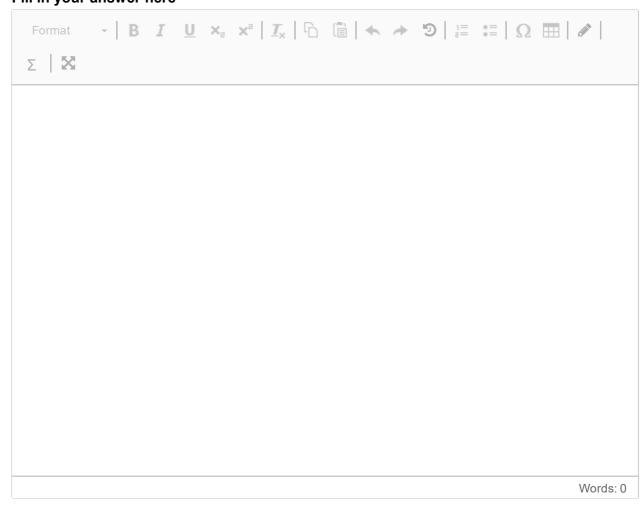


3.5 DevOps

Briefly explain the concept of DevOps. (4p)	
Fill in your answer here	
When should you perform testing in DevOps? (1p)	
Fill in your answer here	
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	Maximum marks: 5

3.6 Challenges in Large-Scale Agile

Mention two challenges regarding *Communication* in Large Scale agile. For each challenge, describe why it is a challenge and propose some possible solutions. (10p) **Fill in your answer here**



i Section 4 - Intro & case description

Case description

A large Norwegian Public Service Company (Company X) has over 1000 employees and develops and maintains a comprehensive amount of IT-systems.

Company X hires consultants from a consultant company (Company Y). The consultants consists of a team of 5 and are hired for developing a solution to facilitate communications between internal systems within in Company X. The consultants develops increments using Scrum and the sprints lasts for 2 weeks.

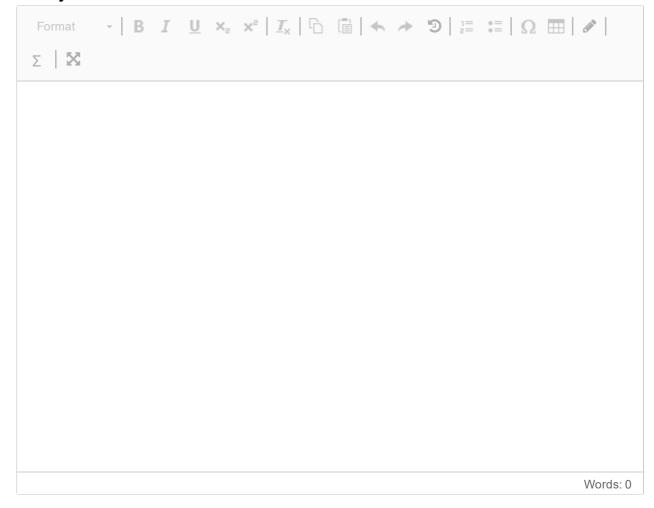
Company Y has run into problems as they are dependent of approvals given by Company X in order to produce new features in each sprint. Company X has a physical weekly meeting were decisions are made - this means it can in worst case take up to one week before Company Y gets approvals.

Company X is unsatisfied as Company Y has not finished the solution within 1 year, which they were budgeted for. This means the project will be way more expensive than what first planned. However, since the solution is crucial for Company X, Company Y needs to finish the solution no matter how long time it will take.

4.1 BPMN

Model a BPMN diagram of a Sprint with the current process as presented in the case description. (15p)

Fill in your answer here



4.2 Process improvements

<u>[ask A</u> Describe two proced	ss improvement techniques you have learned about in this course. (6p)
Fill in your answer	
Took P	
Fask B Apply the two proces	ss improvement techniques you described in the previous task (Task A) c
he process describe	ed in the case description. (10p)
Fill in your answer	here

4.3 Case reflection

The case describes a team trying to work agile within a traditional (waterfall-driven) business.

l in your an	swer here
lect on cha	llenges when changing a large company (more than 1000 employees) from le. (6p)
flect on cha terfall to agil	e. (6p)
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sk B flect on cha terfall to agil I in your an	e. (6p)
flect on cha terfall to agil	e. (6p)