IBE505 Industriell digitalisering

Eksamen 13.05.2022

Kandidatnummer: 22

Front page

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- **Date**: 13.05.22
- **Time:** 09.00. - 13.00, including time for any practical and technical actions needed to hand in your exam paper.
- **Supporting materials:** All supporting materials permitted. It is not allowed to cooperate with or receive help from others.
- **Number of pages in exam question set:** 2
- **Technical, administrative or academic questions:** +47 71 19 59 90 or studentweb@himolde.no
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Keep your mobile phone close by. Important messages concerning all candidates might come by sms.

The best of luck!

Avoid cheating

Cheating is a serious breach of trust towards fellow students, the university college and society.

An exam is a student's individual work. Collaboration with others is not allowed.
If quoting from a source, references to the source must be provided.

Upon delivery of my work, I also confirm that I agree with the following:

- I confirm that this is my own individual work.
- I confirm that I have not collaborated with anyone else (except other group members if this is a group exam).
- I confirm that I have provided references to the sources I have used.
- I understand that it is academic dishonesty and cheating to collaborate with others, or present others' work as my own.

I agree and wish to submit my work for review.

Molde University College has a duty to react against cheating and attempted cheating in all parts of the academic activities. More information about cheating.

1 Assignment

Write your answer in Word and save the document as one single PDF file on your own machine. Upload your PDF file below.

You can find the exam question set in the panel on the left. If you wish to download the question set to your machine, follow this link:

If you are not able to see the exam question set in Inspera, you can also find the question set in Canvas.

Your file is saved in Inspera until the deadline for handing in your assignment. After the deadline has passed, the last version of any uploaded PDF files is submitted automatically.

More information on how to submit in Inspera.

If you have any questions or need assistance, contact studentweb@himolde.no

Question 1

Attached

Molde University College
Industrial digital transformation IBE505
Max marks: 100
Date: 13.05.22
Duration: 9:00 – 13:00 (4 hours)

This exam paper consists of 4 questions, each is 25% of the total grade. Please answer the following questions:

1) **UPS is an American shipping and supply chain management company that intends to use digital tools to synchronize its operations and logistics strategy to better meet customer needs. They ran interviews with a portion of their customers and concluded that there are two major customer experience challenges UPS need to deal with: 1) fast delivery and 2) real-time package tracking. As a chief innovation officer (CIO) at UPS:**
   a) **Can you propose a solution that can significantly improve the customer and stakeholder experiences and enhance efficiencies of the company operations?**
   I would introduce a navigation system that would optimize driver routes in order to improve on goal nr 1, fast delivery. In addition, I would implement the use of drone technology for fast delivery. I would also introduce an online system for real-time package tracking in alignment of goal nr2: package tracking. I would also automate the packing process by using automotive technology.
   b) **Describe what emerging technology you will use to implement that solution?**
   For the navigation system I would introduce the use of IoT and AI together to find the best optimized routes for delivery vehicles. By using the Global Navigation satellite system route planning, driving conditions, cargo status and fuel consumption is made available to the transporters making it more effective and predictive, saving both time and costs.
   I would also introduce the use of drone technology (when appropriate) for faster delivery, avoiding land-based traffic and fuel costs.
   For tracking I would implement the use of blockchains as a tracking system in real time. The usage of smart contracts on the blockchain allows for accurate asset traceability. As a result, blockchain traceability ensures that the customer can see the chain of custody and movement of an object through the supply chain in real time. It provides a safe and accurate way to track information about the location of the package at any time.
   To automate the packing process, I would introduce AI and the use of robotics and robots to make the process more effective, less reliant on manual human labour and thus saving cots and improving the company efficiency.
   c) **Define your role as a CIO within UPS?**
   As a CIO (Chief Information Officer) in UPS I would manage the adoption of these new technologies, I would oversee the implementation and usability of them and make sure that the transformation goes as smoothly as possible. I would in addition to manging the IT staff, focus on our department goals, manage the software development needs of UPS and make the best possible plans to reach them.

d) **If your business has a gap in the skills required to implement your innovative solution, how would you help your business to bridge that gap?**
First, I would conduct a skill gap analysis to understand where the gap exists and why it exists. By understanding why, the how of it will be more accurate. After the analysis is concluded, I would try to bridge the gap by introducing crowdsourcing (gathering of a large group of people with different competencies to collect and produce ideas and services). I would also try to pair IT and business employees with academicians not just for bridging the gap, but also to help facilitate further innovation and retain digital talent. Finally, I would organize training programs, workshops and invest in online digital educational courses for the employees in order to bridge the gap and stay competitive.

e) **The Sustainable Development Goals (SDGs) are a collection of 17 interlinked global goals designed to be a blueprint to achieve a better and more sustainable future for all. The SDGs were setup in 2015 by the United Nations and are intended to be achieved by 2030. Which SDGs your digital transformation solution will positively impact and how?**

I would argue that it could positively effect goal number 9. By using these new technologies, it could help innovate the industry and other industries in addition to help further innovation. It could also be made a case for goal number 17 if we look at the different partnerships that would be made in order to achieve different goals between the IT sector (even the drone industry) and the delivery industry. Goal number 12 could also be affected as this transformation optimizes transport routes, reduces the environmental footprint by using less fossil fuel in addition to the use of drones. Goal number 11 could also be affected by using these new technologies to both trace and transport packages, contributing to a more sustainable and smarter community/city.

2) **The COVID-19 pandemic has affected the education industry and nearly all institutions have been adopted to digital education approaches that make it safer for both students and teachers to meet social distancing constraints while keeping the academic standard unaffected. Major problems with remote learning are the limited access to labs and lab equipment and inability to monitor suspicious activities such as opening tabs, chat boxing in the background, picture exchange and more while students are taking home exams.**

a) **Propose a digital solution to help students to collaboratively run lab experiments from their own locations while enhancing the real feeling of objects and their learning experience?**
I would introduce a study-program solution that introduces 3D-virtual Labs where the students can engage in LAB work through 3D worlds. To experience the lab through the teachers eyes I would introduce a mixed reality visualisation using HoloLens headsets.

b) **Propose a solution that can monitor students' activities during home exams such that it can provide real-time feedback to prohibit suspicious actions and enhance credibility and fairness of such exams in the future?**
The introduction of digital tools can help with the monitoring of students laptops and phones by detecting keystrokes, eye movement and by recording their screen.

c) **Describe the emerging technologies you will use to develop these solutions?**
Tools like respondus and Examity and Proctorio and ProctorU. These are technologies that can help with the tracking and monitoring of students as described in question b. For remote lab work emerging technologies like 3D-virtual Labs and remote triggered labs. HoloLens headsets offers lab work form the teachers POV. This way students can access and conduct lab experiments over the internet from remote locations.

d) **What are the challenges that might impact online learning?**
Some of the challenges related to online learning is the lack of human contact and lack of the ability to discuss problems quickly with other students as well as the lack of realtime feedback. Also, the digital divide between those that have connection to the internet and those who do not may be a problem. Certain requirements and skills are required for students to gain the most out of online learning, therefore these skills and knowledge must be learned in advance.

e) **Refer to 1e), which SDGs your digital transformation solution will positively impact and how?**
The solutions presented above can positively impact goal 4: quality education as the solutions delivers remote education and the digital tools help retain and improve the quality of the education that is given. It can also me made an argument that it reduces inequality in line with goal 10. As education is given a better reach to those who do not have the ability to physically attend schools or universities, this is a step in the right direction for equal rights for all and the distribution of the resources to help us reach those goals by offering education to everyone. Can also argue that goal 11 is positively impacted as these new emerging technologies can help build a smarter city.

3) **As hospitals strive to provide the right care to the right patient at the right time, healthcare providers need to do two things: evaluate patients' needs accurately and manage hospital resources effectively. Shortage in healthcare staff can lead to overworking, crowding and hence more medical errors, and patients feel neglected.**

a) **Propose a digital transformation strategy to mitigate healthcare personnel staffing shortages in hospitals to lower operating costs and enhance services?**
I would facilitate the Introduction of better software solutions like a digital access and control center to better manage and coordinate personnel and patients. I would also focus on the organizational culture in order to adopt and to use new technologies to full effect. This could also make the hospital a more attractive and modern place to work for and thus hiring to cover shortages might go better. Digital recruiting would also help instead of the traditional approach. A shift to data driven healthcare could also help with the use of Bigdata to identify and improve treatment options.

b) **What emerging technologies you will use to accelerate the proposed transformation?**
I would implement the hospital system into the cloud in order to better access the system for all employees. I would also introduce IoT and the use of them as they can significantly increase effectiveness to the employees and make the day-to-day work better, more thorough by relying more on data and access to the hospital system. To accelerate the shift to a more data driven healthcare I would implement AI (artificial intelligence) to utilize (big)data and patient information and use algorithms to help with decisions and improving patient care, to reduce costs, and to boost the staff satisfaction factor. Finally I would use 5G technology to help with remote patient care.

c) **State advantages and disadvantages of implementing this solution on the cloud. State the four different cloud models?**

The advantages of implementing this solution to the cloud is the easy and quick access to the hospitals data. This includes patient data, treatment information and staffing planners which can be accessed through the use of IoT and other technological devices both in and outside the hospital. This leads to a more effective and data driven workforce In addition it provides scalability. Disadvantages may be related to security. Should the cloud be breached sensitive patient data and privacy may be lost and compromised. In addition, should the cloud systems shut down for any reason, the availability may be compromised and thus denying crucial access for both patient and employee. This could compromise patient care. The hospital would greatly rely on the cloud's availability.

The four cloud types:

- **Private clouds**
- **Public clouds**
- **Hybrid clouds**
- **Mulitclouds**

d) **Hospitals and healthcare providers as non-profit/public organizations does not have the skills and resources to finance, develop and run such projects. Can you propose a way to accelerate and complete this solution so expected services are delivered to the public on the right time?**
Partnerships with organizations both private and public could help to achieve these goals as healthcare is in the public's best interest. I would also focus on the organizational culture in order to facilitate the changes I suggested. Skills will need to be learned and the mentality of the employees needs to be aligned in order to adapt and embrace these changes.

e) **Refer to 1e), which SDGs your digital transformation solution will positively impact and how?**

It would impact goal number 3 as it focuses on good health and well being of the members of the society as it could be argued that these changes will improve patient care. It could also impact goal nr 9 as it could improve the industry, other industries by using these new technologies for other purposes which again could lead to innovation and better infrastructure overall. It could also impact goal nr 11 as this transformation could add to the "smart city" making it more smart, accessible and effective. Goal 17 could be affected as the partnerships between healthcare and IT sector and industries would have to work more closely together for the mutual benefit of the society.

4) **Industrial digital transformation can be defined as the minimum effort to stay in business.**

a) **In the commercial sector, industrial digital transformation is driven by two kinds of strategies: defensive and offensive strategies. Define and compare between the two strategies with examples?**

Defensive strategies revolve around protecting the company from both competitors and disruptors. An example can be seen in the car industry where most car manufacturers is producing electric cars even if its loosing them income. This way the company retains customers that can be lost to competitors. It is a responsive strategy/a reaction to the surroundings.

Offensive strategies revolve around disrupting the industry in order to gain competitive advantage. Tesla is an example of a company that uses an offensive strategy by creating new technology.

In summary: as the defensive strategy revolves around staying competitive and reacting to the surroundings the offensive strategy revolves around gaining competitive advantage by actively trying to disrupt their surroundings.

b) **Crisis has always helped industries to identify an opportunity for transformation. A new survey finds that responses to COVID-19 have speeded up the adoption of digital technologies by several years ahead. Explain that with examples?**
Crisis tend to force the surroundings to adapt faster in order to adjust to current situations. The need for fast change drives adoption of digital technologies. Covid 19 is an example where the need for tracking and mass production led to the adoption of technology like 3D-printing of masks, tracking via mobile applications and remote capabilities in terms of medical healthcare and remote learning with corroboration with IoT.

c) **Define technical debit?**
Technical debit refers to the implied cost of making easy choices and the additional cost it creates. In software development a slow and thorough approach might save both time and costs. In summary it is the result of choices in early stages that needs to be reworked later, and the cost it produces.

d) **What are some of the leading indicators of failure in an industrial digital transformation?**

One of the leading indicators of failure occurs when projects does not meet the expected business value or when projects are not completed and is required to start over. This is often the result of the lack of IDT strategy, lack of top-down support and the lack of customer perspective. Can also be the result of not following the plan and too much focus on digital technologies rather than focus on the cultural shift. Can be caused by economic and technological reasons.

e) **What is lights-out manufacturing? How is industrial digital transformation driving lights-out manufacturing?**

Lights-out manufacturing is the description of manufacturing lines where all of the production is fully automated and the role of humans in the factory is reduced to maintenance and repair functions. Industrial digital transformation is driving lights-out manufacturing by creating more technology that replaces manual labour in line with Moore's Law and its "march" to new levels of automation. This leads to more effective production and reduced costs.