Exam 13.05.22
Kandidatnummer: 48

1. UPS

a) and b)
I have here answered both a) and b) in the same answer:

One thing that UPS has already implemented is a Navigation system (ORION) that optimizes the routes when making deliveries. This is using technology such as AI and IoT to minimize driving distances, and has saved UPS many miles of driving and costs. (Nath, Dunkin, Chowdhary, and Patel 2020, page 69) This would probably also contribute to reduced delivery times for customers and the money saved contributes positively to stakeholders' experiences. One suggestion here would be that UPS will continue to optimize this navigation technology through AI and data collection so that they have continually more data to base their system on and that would lead to even more optimized routes through their AI, Machine Learning algorithms based on big data.

The question in the assignment mentions to “synchronize its operations and logistics strategy” and “enhance efficiencies of the company operations”. With this in mind, a suggestion of efficiency and synchronization of operations and logistics could be looking into using blockchain technology and cooperation with other organizations to create synergy and efficiency in data and information exchange. There are emerging collaborations within the shipping industry around blockchain technology such as the Global Shipping Business Network (GSBN) that are exploring and working on blockchain and information exchange (Nath, Dunkin, Chowdhary, and Patel 2020, page 267). UPS will do well in being attentive and at the forefront of possibly implementing similar solutions to keep up with competition and having the most efficient solutions, if blockchain turns out to be a good and effective solution for information exchange for the future. If many companies and organizations start to implement it and platforms for blockchain usage emerges, UPS will do well in being part of it in some way. The blockchain technology can help streamline information and document exchange both in a company and its supply chain and between a company and its collaborators. There are many documents and information being exchanged in shipping and blockchain can contribute to more trustful information as it is in practice unchangeable once information has been stored.

For tracking packages in real time, which was one of the major challenges for UPS, IoT technology would be a solution to tracking. UPS already has tracking measures in place, but to get even more accurate information on the exact location of a package, one could look at implementing small simple IoT solutions to each individual package. Already packages are registered when they arrive at a UPS location/warehouse for sorting or registered to a car once it goes out for delivery. With for instance Bluetooth Low Energy Beacons (BLE) or similar solutions each package could have such a sender that would be picked up by any bluetooth device. This would of course only work where there are bluetooth devices present (like any smartphone or tablet). Cost of implementing this would have to be taken into consideration and also finding the best IoT solution like BLE or similar ones since there is currently quite rapid development in IoT-technology.

c) CIO is the Chief Innovation Officer and this person's focus and responsibility is within innovation process management and change management. This person is responsible for coming up with new ideas themselves or identifying and highlighting new ideas and technologies from others.

d) A skill gap within a business could be handled by developing these skills within the business. This could be done by for instance training classes inside the business for employees, or doing conferences and outside the business. Another solution is bringing in new staff with the needed skills, but partnering these with existing employees which is called cross-training. Another solution could be that some employees do formal education or training. (Nath, Dunkin, Chowdhary, and Patel 2020, page 90)

e) SDG number 17 is about partnerships to achieve goals. The latter solution about blockchain and collaboration touches this area in collaboration within information exchange and therefore could possibly contribute positively to the number 17 goal of “Partnerships to achieve the goals”. Also generally if the suggested solutions provide more efficiency and less pollution because of less travel distance this would contribute positively to SDG number 11 where we have cities with sustainable and effective solutions to delivery.

2. Education industry and COVID-19

a) A possible solution to the need for collaboratively doing experiments with classmates as well as having an experience of objects; could be implementation of VR-technology (Virtual reality) paired with online collaboration. Today most houses and families have an internet connection that is well enough to transmit much data and therefore a real-time experience in VR could be possible to implement. VR equipment could be expensive, but more affordable options such as using smart-phones inside headsets of cardboard also give a VR-experience that is sufficient. Within VR one can create an environment that would mimic a lab experience with a student finding themselves for instance inside a classroom with some other students for collaboration. VR also provides interacting with objects inside the experience to perform actions such as lab experiments. Objects can be programmed to mimic real world objects and have similar characteristics. One could also look at implementing AR (augmented reality) where the real world environment where a user is situated is also included and for instance students can hold and touch real objects that are recognized within the AR/VR experience so that they can touch real things at the same time as having layers of technology in the AR-experience adding to the experience.

b) This is a challenging problem to find a good solution to. One suggestion could be to monitor students during home-exams through image recognition software, paired with software programs that lock students' computers to certain programs. For instance one could ask the students to set up their smart-phone to have the camera pointed at them during the test, and have image-recognition software (like an app they install for instance) that monitors the student themselves and their computer screens. Image recognition technology and algorithms have come far in recognition accuracy. If something suspicious is flagged by the program, an observer (a real person with access to all students real-time video feed) could be alerted to take a look at a specific student to see if there is reason for the suspicion

flagged by the image recognition software. Software to lock students PCs to certain programs could also be implemented and the image recognition software could be programmed to recognize if any other window or app is opened on the students PC. These solutions could be explored but of course have their challenges and would most likely not be fool-proof, but could contribute to monitoring students doing home-exams.

c) For answer *a*): VR/AR (virtual reality/augmented reality) technology has been existing for many years, but is still being developed and improved today. This technology creates 3-dimensional spaces that users can immerse themselves in through wearing a headset, hand-controllers and other alternative equipment to enhance the immersion. This technology provides simulated experiences for the users that can be widely different and creative, and can simulate the real world or something completely different. Augmented reality can combine the real world with simulated reality and for instance have simulated objects appear within the existing environment a user is situated in.
For answer *b*): Image recognition software is an emerging technology that is also being improved and developed continually today. This technology is partly based on AI (artificial intelligence) for the training of algorithms and software to become better and better at recognizing objects, shapes and forms for more accuracy. It can for instance be used for inspection of objects such as airplanes to identify missing or defect parts as an example.

d) To me a great challenge to online learning would be the lack of social interaction. A big part of learning when growing up especially is the learning and forming of social skills and understanding of the world. If students were only to be sitting at home with limited social interaction through screens, there could be non-beneficial consequences for the social development for young people especially. Online education in the sense that students are not leaving their home could also have a negative effect on physical activity when students don't meet and have physical activities together.

e) The solutions above would contribute to goal number 4 of quality education. The suggested technology could be giving students a higher quality in their education through better tools for labs and experiments that would not be accessible without this technology.

3. Healthcare

a) A digital transformation strategy within healthcare could be to implement technology that would ease the workload on staff, leading to better quality for patients and better use of hospital resources. One suggestion here would be implementing the usage of digital twins for patients in the entire population. This would be a preventative solution that hopefully could lessen the amount of people needing urgent health care, by the technology finding and preemptively giving solutions to better peoples health. This could work by having a digital twin of each person and their health statistics etc. and from this data algorithms and AI/ML could find patterns and probabilities to forewarn of potential diseases or conditions before they occur or before they develop quite far/become severe. This could bring down the number of patients needing to go to hospitals for conditions that develop over time. It would not help with cases that are sudden and impossible to predict, such as injuries from car accidents etc. The population should probably have a system for continually collecting data for their digital twin by doing regular checkups with doctors for instance and potentially

having smart devices people usually have such as smart watches or phones send data to the digital twin.

b) The technology implemented would be digital twin technology. This is technology that aims to create a virtual/digital representation of a physical object in the real world. There would also be software within AI used in the analyzing and prediction of health development. This technology uses powerful algorithms to analyze and learn from data.

c) Implementing the solution of digital twins to the cloud would have advantages such as high availability to any and all healthcare organizations and institutions that would need access to the digital twins as well as easily uploading information and data gathered from patients and their treatments etc. Having a cloud solution would ease cooperation and quick data-sharing of the digital twins contributing to keeping them up to date. Keeping the digital twins data accessible in one place would be advantageous for the AI and the continual data analysis and improvement of the prediction algorithms and training.

A major disadvantage with bringin the digital twins and all the data to the cloud is cyber security and vulnerability. No digital solution can be 100% safe from attacks that for instance try to gain access to this data. The data is highly sensitive and can be misused if people with foul intentions gain access to them. Other attacks like ones that are preventing access to the digital twins and the data could occur.

Four different cloud models: Public cloud uses the internet to provide access to cloud services. Private cloud can avoid using the internet to access the cloud services by providing company specific solutions that can be situated at a company's grounds and for instance use internal networks and communication to access it. Hybrid cloud is a combination of the Public and Private cloud solutions. Multicloud is a solution that combines elements and infrastructure from both public and private cloud providers (Nath, Dunkin, Chowdhary, and Patel 2020, page 107).

d) There are several ways of developing such projects and bringing them closer to completion. For a start a solution can be *technology innovation labs* that are evaluating new technologies and quickly deploying them into communities to have a rapid prototype and system testing (Nath, Dunkin, Chowdhary, and Patel 2020, page 220). This would be a faster way of testing and deployment than traditional processes in the public sector that can be long and time consuming.

There can also be hackathons and contests to provide cheaper suggestions and development to the software and solutions that would be needed for the digital twin-solution. These contests would not provide finished solutions but could contribute to finding smart ways to do the digital twins and be a starting point for further development.

e) This solution would contribute to SDG Goal number 3: good health and well-being. If the solution with a digital twin works well and the preventative benefits come into play, it would mean a better health-solution for potentially many people and contribute to less severe hospitalization and diseases for some cases. It could also contribute positively to goal 9 concerning infrastructure and innovation - if the solution becomes widely implemented it would be a part of an information infrastructure in healthcare that would be positive.

4. Industrial digital transformation

a) *Defensive strategy*: The defensive strategy entails that the business is compelled to implement digital transformation due to competitors and disruptors around them (19). As the name implies this is a defensive strategy since the company is not on the forefront of implementing digital change, but rather they are implementing this when it becomes necessary to change to survive in the industry and to be able to compete with its surrounding competitors and disruptors (Nath, Dunkin, Chowdhary, and Patel 2020, page 19). An example of this is the car industry where many companies started with electric cars because of competitors and disruptors around them and they saw that they needed to start with electric cars themselves as a defensive strategy to survive since much indicates that the future is good for electric cars (Nath, Dunkin, Chowdhary, and Patel 2020, page 19).

Offensive strategy: The offensive strategy entails that a company does something new and different than its competitors to disrupt the industry. This would give the company an advantage in standing out and adding competitiveness if it goes well and taking over parts of the market. There are not usually any outside forces that compel them to do this unlike the defensive strategy. The company takes initiative to introduce new technologies or new ways of doing things to disrupt what has previously been the norm in the industry. An example of this is Tesla who introduced innovative ways and technologies to make and sell electric cars (Nath, Dunkin, Chowdhary, and Patel 2020, page 20).

b) There are many technologies development and implementation that have been sped up by the crisis of COVID-19.

One example is development and deployment of tracking and location technology using smart devices and proximity with for instance Bluetooth signals to track and discover the spread of the virus.

Another example is increased collaboration between businesses and making information open-source to develop ways and technologies to produce vital healthcare equipment such as parts for masks and ventilators with 3D printing.

Another example is IoT-based technology that was quickly developed and deployed to remotely monitor patients to fight the pandemic.

(Nath, Dunkin, Chowdhary, and Patel 2020, page 32-34)

c) Technical debt can also be called design debt or code debt and it means the additional costs of having to develop something over again because of selecting a “quick” and “easy” solution (which proves to not be sufficient) instead of taking more time to develop something sufficient, but which would take longer time. If this suboptimal solution is not addressed, it can affect further development and continue to cause suboptimal results down the line as well since building on something not working well, causes further technical debt. (Nath, Dunkin, Chowdhary, and Patel 2020, page 228)

d) Leading indicators of failure in Industrial Digital Transformation are:

Lack of industrial digital transformation strategy - Not having a strategy and plan for digital transformation can be a clear indicator of failure. Such a plan is needed to initiate strategy in this area and to have a framework for development over time (Nath, Dunkin, Chowdhary, and Patel 2020, page 328-329).

Other indicators would be the lack of support from top leadership in the area of industrial digital transformation. This would leave the leadership in this area to lower management (Nath, Dunkin, Chowdhary, and Patel 2020, page 329).

Another indicator for failure in this area can be an inward focus instead of an outward customer focus and focus on developments in the industry (Nath, Dunkin, Chowdhary, and Patel 2020, page 329).

e) Lights-out manufacturing is a way of doing manufacturing where the entire production line is all done by machines and is automated. The employees only help with maintenance and repairs. Industrial digital transformation is driving lights-out manufacturing through the developments such as standardization (which simplifies using machines since everything is developing towards operating with fixed standards that can be repetitive processes adaptable to machines), systems such as automated material handling systems and scheduling systems, and sigitalizations in systems for monitoring and control (Nath, Dunkin, Chowdhary, and Patel 2020, page 179-183).

Sources:

Varan Nath, Shyam, Ann Dunkin, Mahesh Chowdhary, and Nita Patel. 2020. *Industrial Digital Transformation*. Birmingham, UK: Packt Publishing.