Q1

a) In the book Industrial Digital Transformation, the authors say that "*A true digital transformation is a disruptive innovation that fundamentally changes the user experience.*" (p.43, Industrial Digital Transformation), which in this case I'm going to do as a CIO in UPS. In this case I need to make sure that UPS has a fast delivery and real-time package tracking. By now, drones have become a more natural and experimental part of our daily lives. We use them for stunning photo shots, to get an aerial view or even using them combined with AI technology to investigate powerlines and detect flaws. My propose is to start using drones for fast package delivery. In bigger cities there might be a lot of traffic so the delivery may bee a bit delayed. This way the drones can fly over the traffic and spare a lot of time not waiting for the green light etc. Another thing with drones is that they have a GPS built in. Imagine that every drone can carry some amount of kg each and every drone has its own QR-code which the customer can scan for live update on where their package is. The scanning is also meant for confirming that you have the right package upon delivery. A team of surveillance will be needed to monitor the drones and the delivery process to make sure that everything is running smoothly. There will also be an application for mobiles where you scan the QR code to get information on your package but also to notify the customer when a package is coming and to confirm the delivery of your package and not some others package.

b) First, I'll be needing some big drones, a hq for the drones to recharge and take-off/land, built-in GPS tracker, a net or something that can hold the packages, mobile application, monitoring, and AI technology. The AI will recognize buildings, cars, birds, wires, trees, mountains etc. for keeping the drones and people safe while flying.

c) A CIO stands for Chief innovation officer. In the book a person titled CIO has a job to be the "*the initiator, leader, and executive sponsor of any digital transformation efforts.*" (p.75, Industrial Digital Transformation). So, my role as a CIO is to run and think of creative ways to use technology in an experimental way so that UPS can benefit on the investments made in the project. I'll be the leader of the IT department and will oversee the whole project.

d) If UPS was having a gap in the skills required to develop this solution, I would send a team from my IT department to a course to try and learn as much as possible to have the knowledge to implement a system. If that doesn't work, I need to look for new employees with the skillset were looking for. Alternatively, we could hire programmers for the time it takes to create a software that works, but we will need people operating and doing maintenance on the software anyway.

e) Since the solution is driven by drones in the city, UPS will be cutting down on physical driving of UPS trucks and vans. However, UPS will still need some trucks to deliver "out of range" packages in other countries for example. But this transport method is often done by train and then a cargo ship or plane. That's why the UN SDG number 11 (sustainable cities and communities) and 13 (climate action) suits this solution. Goal 11 is about making cities smart and to remove the overfilled streets and the cars with something not harming the air the citizens breath. A tiny bit of the city's infrastructure will change when the UPS cars are removed and replaced with drones in the air. Goal 13 is of course about climate control, and as mentioned above, removing cars from the streets are a big step towards changing the pollution and rising greenhouse emissions. The drones are powered by solar technology and the project is all green.

Q2

a) So, if the students need to run lab experiments from their own location and they need to have the real feeling of objects and their learning experience, the best technology for that is VR (virtual reality). This solution is a full-scale digital lab with all the equipment that the students can find in their school lab. The point is that the students will feel like they're on the school even though they are at home or somewhere else. In this lab other students can join sessions or create private sessions if groups must complete or practice for a mandatory assignment or exam.

b) To monitor students' activities during an exam, the solution can be a restricted exam browser that has to be the only window open on the student's computer screen during the exam. If this window is closed or the student tries to minimize or change the

window the exam will quit, and the student will not be able to write anymore or open the exam again. This way the students cannot open any other documents on their computer. But this only solves one part of the problem. Using their phone is another. A student can easily take a photo of the questions and send it to other students to work together. That's why the exam browser needs to work with the students' phones. To login on the exam browser, every student has to use their username and password alongside the exam app. This application is connected with the student's profile and phone number. The app works in the same way as the computer browser, it locks the student's phone for the time the exam takes. If a student tries to close the app or switch to the home screen the exam is over for the student.

c) In 2 a) the technology will of course be VR, but it will need a database for all the equipment that is going into the virtual lab. This solution will take a lot of time to complete, and everything will have to be designed/scanned and have the same abilities as the real item in the real world. Using a 3D scanner, the process can be shortened as it saves time for the design team, and it will also give the correct size from the beginning. In 2 b) you only need a skilled javascript team to implement a browser with restrictions. You will also need a team for developing the app for the smartphones and you have to make it available for all smartphones.

d) When it comes to online learning, most students thinks that it can get a bit boring sometimes. It's easy to check your phone if you're bored, do other things, or just pretend that you are in a mandatory class just because you have to. It's easier to not pay attention because of all the distractions. Another challenge that impacts online learning is the professors. If their class is not responding to a question or not answering questions in class, or if some or none of the students have their camera on, I can think that the professors might lose the desire to teach or lack of energy/motivation to teach. In my experience the professors like to see the students faces and to connect with them through interactions and having debates about a topic.

e) My solutions in 2 a) and b) are based on the UN SDG number 4 (quality education) and 12 (responsible consumption and production). Quality education speaks for itself by creating a virtual lab so that students, despite covid and global pandemics, can still learn what they have too though they have to stay home.

The reason why I chose responsible consumption and production, is that my solution would over time become a solution being used worldwide. Goal number 11 is about cutting down the global material footprint. Imagine labs that only uses cash for maintenance on the VR lab instead of buying equipment made from plastic, other pieces of equipment arriving in plastic packaging. If this solution was made available global, the demand for plastic would decrease and the global footprint could also decrease, especially the ever-increasing plastic and micro plastic problem the world is facing right now.

Q3

a) The use of AI technology in the sense of detecting symptoms of deceases instead of using time and capacity at a doctor or hospital.

b) AI technology based on big data holding information on different deceases and symptoms in different stages of these decreases.

c) There are four types of clouds: private and public clouds, hybrid clouds and multi clouds. Advantages of this solution based on a cloud model is that it will be accessible by anyone with an internet connection. Disadvantage with a cloud model is that there might be sensitive information in the cloud, that when upon a breach can be fatal for people.

d) A way to accelerate this solution on the right time with the skills and resources needed would need the governments full attention. They would need to hire a big IT firm and put a lot of energy on getting up and running. Maybe put other projects on hold for a while.

e) With this solution people can detect early stages of deceases without having the money or need of a hospital visit. They can take advantage of the AI technology in form of an app and the technology processes that using AI and will give you an assumption of what you might have. This relates to the UN SDG number 4 (Good health and well-being).

Q4

a) Defensive strategy is a way for the business to keep them selves protected against other competitors. An example mentioned in the book is car manufacturers. They were forced to produce electric cars because the market was set to grow by 20% (p.19, Industrial Digital Transformation). Even though the manufacturers lose income on every car they produce the production of electric cars will go down over time.

Offensive strategy, however, is when a business tries to disrupt other businesses or a whole industry. Tesla is an great example of a business using a offensive strategy. They have been the leading electric car manufacturer for some years, and the solutions they come up with are always new thinking and experimental like the autopilot function.

Now that we know the different strategies, we can see that the offensive strategy is changing the industry. When Tesla introduced the Autopilot and all it functions also within the app (parking and "drive to me" functions) the businesses using a defensive strategy had to try and adopt some technologies themselves. Even though Tesla didn't come up with a self-park function first, they digitalized the already working function and had major success. For some people the old and easy is often the best, that's why some of the businesses with the defensive strategy can still operate.

Not all people want's their car to be controlled by an application with a big iPad in the middle of the car. They want the traditional knobs and buttons to turn. The conclusion is that the two different strategies are pushing each other, but I can't see a reason why one strategy will dominate the other. We need both.

b) The reason why COVID has speeded up the adoption of digital technologies by several years, is because of the need to access information and do daily things without interaction with a human because of the pandemic and threat of ending up with the virus. As a human we need food and supplies to live, simple as that. What do you do when you are not able to go to the store? You do have a phone/computer at home alongside a wi-fi connection. The solution is simple, you digitalize. Your daily food market is now in your hands at home, just as if you where in the shop. This applies to other physical shops that didn't have an online shop before the pandemic. Shops had to close because of lockdowns, and they lost a lot of money because of that. Production companies that relied on handcraft also turned to digitalization, because that meant they could still produce goods without the people and not lose big amounts of revenue. The only way we can interact, shop, produce, connect or help during a global pandemic is by the internet. The need of digitalization has never had a bigger need than during COVID.

c) Technical debt is a term used for taking shortcuts when creating software. The code is poorly designed because of the governments limited budgets. Technical debt can also mean future costs because of the bad coding that is done based on easy solutions instead of thinking ahead.

d) Some of the leading indicators of failure in an industrial digital transformation (p.328, Industrial Digital Transformation):

- Transforming your business because others try to do the same.
- The business board does not pay attention the transformation and prevents top-down support.
- Focusing inward rather than seeing the customers perspective.
- A consulting company who unsolicited created a pitch about transformation.

e) Lights-out manufacturing is when a production company has their entire production line automated, like for example the beer industry or car industry. The only jobs humans have, are to repair the machines or to do maintenance on them. How the industrial digital transformation is driving this type of manufacturing is by demand from the world and the need for faster production to offset the big demand. It is also cheaper for the company to use an automated process instead of paying hundreds/thousands of employees when the machines can do it for free (after the purchase cost is covered) and they only have to pay ten employees to do repairs etc.

Sources:

Shyam Varan Nath, Ann Dunkin, Mahesh Chowdhary and Nital Patel, "Industrial Digital Transformation", *Accelerate digital transformation with business optimization, AI, and industry 4.0*, 2020. Packt Publishing Ltd, Birmingham-Mumbai. ISBN 978-1-80020-767-7.