Industrial Digital Transformation IBE505

Question 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?**

A solution I would suggest would be contactless delivery services such as autonomous robots. This would help with several challenges.

These autonomous robots help with contactless delivery in pandemics, they are small enough to drive on the sidewalk meaning it will help with traffic congestion and delays that comes with that. This would help immensely in a city with high population and high traffic congestions. In cities there are also problems with lack of parking spaces and for delivery trucks to unload their deliveries.

An autonomous robot like this would also be easy to track for both UPS and the customers, in comparison to a standard delivery truck.

Autonomous delivery robots would also help with lowering transportation costs – fuel, waiting in traffic, repairing and maintenance of vehicles etc.

b) **Describe what emerging technology you will use to implement that solution?**

Robotics, more specifically Autonomous Guided Vehicles (AGVs)
These robots use cameras and GPS to navigate themselves to get from A to B. Using technologies like this, including scanning, they can go around obstacles.

c) **Define your role as a CIO within UPS?**

My role as a CIO is to find the best IT-solutions to support UPS. I am the leader of a digital transformation within the company, and I am the one who initiates changes when it comes to technologies and makes sure that there are competencies enough for a digital transformation.

In this situation, I would be the leader of the implementation of the autonomous delivery robots. I would make sure there was a team with enough competency, bridge the skill gap where needed and manage the whole project.

I must also keep these principles in mind: informed risk-taking (embrace failures and demonstrate that failures are experiments that does not work, not something that needs to

be fixed), that we want to be a learning organization (systematic problem solving, experimentation, learning from past experiences and others, transferring knowledge), have customer focus (user-centered design, listen to customer feedback and understand the users' needs), and partnering (development team must partner with the shared service providers and the customer throughout the product life cycle).

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?**

As a CIO, I would invest in training of employees that would be managing the autonomous vehicles. This could be online training, conferences and courses, and in-house training. I would also think about hiring someone who is already trained and have a degree within Robotics and information technology.

I would be costly and impossible to fire all the old employees and switch them out with all already-educated people, so a good solution would be to train employees and hire some with a degree – a good mix of competencies to help UPS with a digital transformation.

This would also be a great opportunity for employees to teach each other and work closely together, as digital transformation relies on collaboration and effective team work.

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?

My digital transformation would positively impact

Goal 13 - Climate action:

As a lot of autonomous robotics will replace old-fashioned delivery trucks, this will help with pollution and traffic congestion. Waiting in traffic, driving short distances back and forth is not good for the environment. I believe my digital transformation would help with emissions.

These autonomous vehicles are much smaller than delivery trucks, and have lower power consumption and does not need fuel.

Transportation accounts for a high number of emissions every year and as online shopping is getting more popular for each year, this number will only increase.

Question 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?**

A solution for this could be a VR-device for every student and teacher. This would help with the feeling of being in the classroom with the other students and teachers, while still being at home and not risk getting Covid. A VR-headset will allow the teacher and the students to join a virtual classroom – not only that, but the teacher can also take the students anywhere. The lab, another country or under the ocean. It will help make the learning from home more exciting and interactive.

A known problem with at-home lectures is getting the students to interact and to stay focused and ensure that they are learning. A virtual classroom can help the students stay focused as they are in the classroom with everyone else instead of getting distracted by things at home. VR makes learning from home interactive and will engage the students more than a Zoom-lecture would.

In VR, you are able build shapes and 3D-objects and interact with them. This will help with lab experiments that are difficult to do at home. With the VR-headsets and controllers, the students can do the lab experiments just like they would at school.

It would also help teachers monitor the students and make sure the students are participating and learning.

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?**

VR could be used in these situations as well. It could put the students in a virtual room, and this could help monitor the student where you can clearly see that the student is not cheating or collaborating with anyone else.

c) **Describe the emerging technologies you will use to develop these solutions?**

VR (Virtual Reality) gives u a simulated experience and generates realistic images, sounds, and other sensations to simulate a person's physical presence in a virtual place.

It is done by using a headset that will provide you sound and images, and it also comes with controllers so you can interact with the virtual reality. This comes in handy especially in this situation as students will be able to interact with others and the lab experiments.

d) What are the challenges that might impact online learning?

This would be expensive for schools or the students (depending on who are paying the expenses) for the VR-equipment. It would also be a problem for those who do not have the funds to pay for either internet connection or equipment like VR-headsets. Unstable internet connection can also impact online learning.

Even though the technologies have come far, a virtual classroom will still not be able to replace being at school fully.

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

My digital transformation would positively impact

Goal 4 – Quality education:

This gives the students a better experience from home while still being safe from a world-wide pandemic. Another thing that it helps prevent that is a widely spread problem in America are school shootings. While being in a virtual classroom from home, the students and teachers are also safe from a catastrophic happening like that.

Question 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 suggest implementing robotics and remote patient monitoring.

Robotics can assist with several things. Such as delivery within the hospital (food delivery, blood delivery, equipment delivery). This can help nurses and doctors free up time and use it where human resources are needed. Robotics can also be used during surgery as assistance.

Using IoT-devices, it can help with patients not having to come in for checkups, as it can all be monitored by sensors remotely. It can help measure blood pressure, blood glucose levels, CRP levels in the blood, weight etc. Again, this can help free up time for doctors.

b) What emerging technologies you will use to accelerate the proposed transformation?

Robotics for delivery of food, medicine, equipment etc.
Autonomous Guided Vehicles (AGVs) can be used in this situation also.

These robots are equipped with sensors that helps them navigate around in the hospital and going around obstacles.

Robotics can also be used during surgery, as they can help perform risky operations with great accuracy and control.

Using IoT for remote patient monitoring, so the doctor and the patient can monitor their health and pick up any irregular data in the patients' health.
Using sensors and Wi-Fi, the data is sent directly to the doctor, meaning the patient does not have to come in for regular checkups.

This can also be done by using either a mobile telephone or a smartwatch as these have activity trackers, multiple sensors, accelerometer, gyroscope, magnetometer, barometer and microphones – all these can help with gathering data about the patients activity level, health and other important data.

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

Advantages:
- It is more affordable than having to buy new software and hardware
- Scalability: They are able to scale their storage capacity easily

Disadvantages:
- It can be a challenge for healthcare workers with little to no IT-experience to grasp modern technologies such as cloud-based concepts.
- With little to no skills about modern technologies, this can be a danger to keeping sensitive data about patients safe

The four different cloud models are:
Public cloud
Private cloud
Hybrid cloud
Multicloud

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?

A solution could be technology innovation lab, where they can evaluate new technologies which can help deploy these technologies fast. These labs have a special procurement authority to accept free services and they can run low-cost pilots, not needing to follow the government's standard processes.

These technologies can be IoT devices and machine learning which is used in the solutions I proposed earlier in 3a) and b).

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

My digital transformation would positively impact

Goal 3 – Good health and well-being:

As my digital transformation will help free up time for nurses and doctors, this can help them use time where human resources are needed. This will lead to patients not feeling neglected but looked after and safe. Robotics and IoT will also help prevent human errors in surgery and data analysis.

Question 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?

The defensive strategy is about protecting the business from competitors and disrupters. An example of this is when car manufacturers started to produce electric cars as a defensive strategy when Tesla disrupted the car-marked with their electric cars. Tesla is a good example of an offensive strategy.

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?

The Covid-19 crisis has led to many organizations having to find contactless solutions – people have been working from home and employees are getting more integrated into technological environments. Remote working and solutions have been needed in this situation. Like Zoom and Teams for meetings, contactless delivery like autonomous robot vehicles, cybersecurity is getting prioritized, 3D printing of masks and ventilators, remote management for ventilators with IoT technology, remote patient data monitoring. There are a lot of great examples.

This crisis has been pushing people to find new innovating solutions to keep people safe from a then-unknown virus that took over the world extremely fast.

c) Define technical debit?

Technical debt is when there is a cost of additional rework because an easier and limited solution was chosen instead of using a better approach because it would take longer. It is an result of prioritizing fast delivery over something that could be perfect.

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

Some of the leading indicators of failure is lack of an industrial digital transformation strategy, lack of top-down support from board, they are being narrow minded, and there is a mismatch of planning instead of just doing (improper use of MVPs and not including the end-customer)

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

Lights-out manufacturing is when the entire production line is fully automated and the only role of people in the factory is for maintenance or repair purposes. Raw materials enter and out comes finished product.

Technologies like IoT devices/sensors for anomaly detection and predictive maintenance, virtual metrology and digital twins are helping defects be as low as possible and for lights-out manufacturing to work.

It also uses Machine Learning for yield prediction and Big Data for yield troubleshooting.