IBE 505 - Industrial Digital Transformation

1. UPS
    a. A solution to improve customer and stakeholders' experiences and to enhance the efficiency of UPS' operations can be to utilize traffic data analysis to improve routes, autonomous vehicles (AV) for delivery and to use Near Field Communication (NFC) tags to mark and track packages.
    Standardization of packaging can also simplify the transportation process to make the handling more suitable for robotics and AVs.
    b. What emerging technology to implement?
        - Artificial intelligence (AI) – By utilizing AI and machine learning in the analysis of Traffic data, the routing of vehicles and goods can be performed automatically and with increasing accuracy.
        - AV – Land based AVs like autonomous cars needs fewer breaks that a manned vehicle and can be easily rerouted.
        Air based vehicles can also be utilized over short distances and are not affected by heavy traffic or confined to roads.
        - NFC – NFC tags can be utilized on packages to quicker scan and track packages through the transportation chain.
    c. The role of CIO, Chief Information Officer, in UPS would be to ensure that the IT solutions already utilized by the company runs as smooth and effective as possible and at the same time, look for opportunities to improve the business' processes by introducing new technology to support or replace slow processes.
    d. To mitigate a skill gap in a business, the business can either hire new personnel with the needed skills, buy the services from a different company or perform training and offer education for the staff already working in the business.
    e. Sustainable development goal impact:
        - 12 – Responsible consumption and production – By standardizing packaging material, it can become easier to produce and to reuse.
        - 13 – Climate action – By using traffic data and AV, the emissions can be reduced.
2. Digital education
    a. A digital solution to lab work in education is using simulators with the ability to replicate the features and properties of liquids and chemicals. By adding VR/AR on top of that, the immersion can be even greater.
    b. By using installed software with AI to the computers used by the students, the students can be monitored on that single device. If you include camera access the monitoring can be even better. By containing the data to the computer in question and only submitting the result of the AI's evaluation with blockchain verification, can be a way to cover GDPR regulations.
    c. Emerging technologies:
        - Simulation – By using graphics engines like Unreal Engine or equivalents, the simulation of fluids and reactions are close to realistic.
        - Virtual reality (VR) – By using VR the students can be present in a "lab" digitally.

- Augmented Reality (AR) – by using AR the students can be presented with digital versions of subjects presented in their “real life surroundings”.
- AI – By having an AI monitor and evaluate the programs used and actions done by the students, monitoring can be done instead of blocking.
- Blockchain – By using blockchain verification, the schools can be certain that the result of the AI’s evaluation hasn’t been tampered with.

d. Challenges impacting online learning
   - Digital divide: The access to technology, both for schools and students will be a challenge for online schooling. Public schools and poorer communities don’t have the same access to technology and connectivity as private schools and richer communities.
   - Technical skills of educators: Technology is evolving at a faster and faster rate, but the teachers and lecturers don’t necessarily have the skills or education to exploit the opportunities presented by the new technology.

e. SDG impact
   - 1 – No poverty: With easier access to schooling online, the education level will go up and create more options for the students in terms of work and providing.
   - 4 – Quality Education: By providing online schooling with new technology the quality of the education will go up.
   - 13 – Climate action: By providing decentralized schooling, the need to travel to school can be cut down.

3. Hospital/healthcare
   a. By using emerging sensor technology connected to monitoring centrals some of the challenges with staff shortages. Autonomous robots can also relieve the nurses and medical staff by doing tasks that doesn’t require human interaction.
   b. Emerging technology to implement:
      - IOT devices – By using medical sensors connected to a monitoring central, the patients can be monitored closer and response measures can be controlled from a centralized point. That way, the most critical cases can be responded to first.
      - AI – By utilizing AI in the monitoring of patients, trends and details that easily can be overlooked by a human, can be monitored and responded to. This can lead to earlier intervention if a medical emergency arises or even before the situation becomes an emergency.
      - Robotics – By using robots in medication dosing, food preparing, transportation of goods and cleaning, the medical staff can be relieved of tiring and time demanding tasks.
   c. Advantages of using cloud
      - Scalable environment
      - Cloud computing – Cloud computing can increase the amount of data the systems can handle and utilize machine learning to increase the accuracy of the responses needed for complicated medical issues and assist decision making.

      Disadvantages of using cloud:

- Security of medical records is extremely sensitive, and any breach of security can result in medical data being used to exploit and target the patients with malicious intent.
- Disruption to connection with servers can quickly result in loss of life in a medical situation.

d. To mitigate skill gaps and resource issues, creating private-public partnerships will be essential. An agile development with clearly defined Minimum Viable Product (MVP) can also help the implementation process. Testing the technologies in non-critical areas of the medical service will also relieve the need for contingencies during development.

e. SDG Impact
   - 3 – Good health and well-being – By using technology to relieve medical staff, the health care can be provided at a lower cost and with increased accuracy and less mistakes.
   - 17 – Partnerships for the goals – By partnering with private companies

4. General IDT
   a. Strategies
      - Defensive – A defensive strategy is used to protect the business from disruptions or competition in the market. Ex: Blueberry's focus on delivering security and specialized services on an old format when Apple started introducing smartphones with touchscreen.
      - Offensive – An offensive strategy is to try to disrupt a market or an industry. Ex: SpaceX's disruption of the highly monopolized space industry by working for space tourism and reusability of rockets.

   b. Some examples of COVID-19 speeding up adoption of digital technologies are:
      - Online schooling
      - Contactless payment and payment solutions for cellphones
      - Home delivery grocery shopping
      - Online medical consultations and monitoring using IOT devices and personal sensors.

   c. Technical Debt is old technology that in order to create good solutions for a digital transformation should be replaced or updated, but due to circumstances (mostly financial) still is present. The term "technical debt" implies that the cost only will grow the longer it takes to perform the necessary investments or changes.

   d. Some of the leading indicators of failure are:
      - Running out of resources
      - No or little leadership interaction/oversight
      - Lack of overall Digital Transformation strategy
      - Introspective focus instead of following the market and customer needs

   e. Lights-out manufacturing is manufacturing done mostly without human interaction and therefore the environment doesn't have to be suited for humans to work there. Example: lighting, temperatures and air quality. The process of manufacture is done by autonomous robots and human interaction is only needed for repair/maintenance or errors in the process.
      Industrial Digital Transformation is driving lights-out manufacturing by introducing more advanced robots, sensor technology and software making it a cheaper and safer way of manufacturing than using human manpower.

Sources:

1. Shyam Varan Nath, Ann Dunkin, Mahesh Chowdhary, Nital Patel (2020). Industrial Digital Transformation. Packt Publishing
2. UN Department of Economics and Social Affairs, The 13 Goals. Web page: https://sdgs.un.org/goals