Q 1)

a- on-road integrated optimization navigator routing system **(ORION).** This could the drivers to drive less miles per day. The system will try and find the most efficient and effective rout to take, which of course will decrease miles driven and lead to a faster delivery time.

For a faster delivery time I will suggest drones and self-driven AI robots could a good solution for deliveries that are not that far away from the warehouse if the regulations allow that. Such robots that are being used now by Amazon to delivery their products to their customers.

b- For real-time tracking I will need a connectivity solution to transfer sensor data from the sensor node to the computational elements that can be distributed between sensor node, gateway device or to the could. So for this particular issue I will use IoT **Cellular 3G/4G networks,** since It provides a reliable broadband communication over a very wide coverage area and providing real-time performance.

For fast delivery I will use emerging technologies such as IoT, and AI to develop on-road integrated optimization navigator routing system **(ORION).**

c- As Chief innovation officer my role will be identifying new opportunities for their organization to deliver digital services to their community. I will also be responsible for the overall IT strategy and implementation of an organizations tehchnology infrastructure. A few of my tasks include Designing IT strategie, Supervising the implementation of new IT tools and thechnologies, IT service management, initatior, leader, and executive of the digital transformation efforts.

d-

Cross-training: One of the fastest ways to develop new skills in an organization is to hire new staff.This approach, however, is not without risks. If new staff are hired and then given lead responsibility for the digital transformation, the existing staff will be resentful and will be unlikely to contribute to the transformation.

In-house training classes Fundamental skills that many or all team members will need to effectively contribute to the digital transformation should be delivered in-house to intact or mixed teams. These skills will vary by organization but may include training on the use of development languages and libraries the team will use or tools such as CAD systems, code repositories, or automated test suites.

Conferences and off-site training The broad array of technical skills required to deliver new products means that while many skills are needed across a broad cross-section of the organization, an equally
large number of skills are needed by a handful to team members with specialized responsibilities.

Degree programs and other formal education The environment in which digital transformation teams work continues to evolve rapidly and skills in the newest tools and technologies will always be at a premium. Rather than fighting to acquire these new skills on the open market, investing in existing staff who are interested in retooling makes great sense for most organizations.

e- My digital transformation solution will positively impact Goal 9 **(industry, innovation, infrastructure)** and climate action as it will decrease miles driven per year which means less CO2.

Q2)

a- Using Augmented reality **(AR)**. AR is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. VR devices provide a simulated experience to generate realistic images, sound and other sensations to simulate a users physical presence in a virtual environment.

b- Build a virtual monitoring system. The system can sense and interact with their environment and generate actions to give a real-time feedback to prohibit suspicious actions. by using sensors and emerging technologies to make the system able to sense the environment in the physical world.

c- AI will be used for image recognition, virtual agent which will give feedbacks. and **MEMS** sensors that will sense motions, acoustic, touch, etc. and IoT networks such **4G for real-time interaction and feedback**.

d- While the public sector faces all the same digital transformation challenges as the private sector, the public sector faces an additional group of challenges. The laws and rules that govern the way that the government buys products and services, hires staff, and manages projects, along with the cultures that have evolved in the public sector, can slow or stop digital transformation efforts. These challenges include the following: **Access to new technology**, **Government culture**, **Hiring challenges - processes and pay and skill gaps**
, Budgets and technical debt

e- This digital transformation will positively impact Goal 4 as it will deliver a better quality education remotely and it also provides education everywhere in the world.

Q3)

a- A remote patient visit which requires only that the patient has access to a telephone or computer with a camera and to broadband internet. Patients engage in video visits with their primary care team, including physicians, nurses, nurse practitioners, and physician assistants, and with specialists as needed. The care team can write prescriptions, order tests, and update the patient's medical record all remotely. The care team is also able to view test results and engage in follow-up activities, all without the patient entering their office. Virtual care team visits are augmented by the explosion of IoT devices that can be used to monitor patient health and compliance without the patient returning to a doctor's office or hospital

Healthcare delivery and support services, especially in hospitals, are increasingly performed with the assistance of digital technologies. Complex surgeries are now assisted by robotics, while patients are monitored by a wide array of internet-connected devices, including everything from EKGs to thermometers. Within hospitals, robots are used to free up pharmacists and reduce errors by dispensing medications from hospital stock automatically when a physician enters a request in a patient's electronic medical record. Modern medical care has been transformed by the Internet of Things (IoT) delivering a myriad of data to medical providers as part of electronic medical records that can then be shared with providers around the world to ensure continuity of care

b- Emerging Technologies that will be used is IoT, AI and Robotics, AR, computing, Sensing

c- **Public cloud**: In this implementation, the cloud provider offers access to cloud hardware and software services through the internet. Users, therefore, do not need to design, purchase, install, or maintain any hardware, software, or supporting networking or security infrastructure.

Private cloud: Private cloud is an implementation of cloud infrastructure that is operated exclusively for one company.

Hybrid cloud: Hybrid cloud integrates private and public clouds, using technology and management tools that allow workloads to move seamlessly between the two as needed for optimum performance, security, compliance, and cost-effectiveness.

Multicloud: This implementation uses infrastructure and components from different public clouds and uses services from two or more major cloud providers, or services from a major cloud provider and at least one SaaS software vendor.

d-

e- This digital transformation will impact SDG 3 which is the Goal for good health and well-being.

Q4)

a- The defensive strategy of transformation refers to protecting the business from competitors and disrupters. Most car manufacturers started manufacturing electric vehicles as a defensive strategy.

While most automobile manufacturers pursued a defensive strategy, Tesla is an example of using an offensive strategy, where it is trying to disrupt the rest of the industry

b- The voluntary use of smartphone location technology to track the risk of infecting others. Smartphone data has been utilized to track adherence to social distancing guidelines. Another is 3D printing of masks and ventilators to speed up the production of critically required materials and equipment. In the same vein, the medical devices manufacturing company Medtronic and Intel are working together to add IoT features, such as remote management capability for PB980 ventilators. This allows the clinicians to control and adjust the settings of the ventilator remotely. As a result, they do not have to go to the **Intensive Care Unit** (**ICU**), thus staying away from patients. This reduces the healthcare worker and clinician's exposure to patients recovering from COVID-19.

c- As a result of budget constraints and the sheer amount of technology in place, many public sector agencies are carrying a great deal of technical debt. While the idea of technical debt was once only applied to taking shortcuts in software development, it is now broadly understood to include not only poorly designed code but also obsolete software and hardware.

d- Failed transformations can take many forms. They can include individual projects that do not achieve the expected business value or those that never reach completion and must be restarted. Failed transformations can have more dire results, causing a company to lose its competitive advantage with an entire product line, or even an entire company to file for bankruptcy.

The lack of an evolving IDT strategy in an enterprise is often a recipe for disaster. According to a Celonis 2019 survey of 450 executives, 45% of the C-suite did not know how to initiate their digital transformation strategy

Other indicators:

- The board does not pay attention to, and provide oversight for, the digital transformation and leaves the effort in the hands of management. This prevents top-down support.

- An inward focus versus industry sector trends: For example, Blockbuster looked at stopping late fees as a $200 million loss in revenue, rather than seeing it from the A mismatch of planning versus doing: Improper use of **Minimum Viable Products** (**MVPs**) and lessons learned from *fail-fast.*

- Too much emphasis on technology and not enough emphasis on cultural shifts:
  A 2018 report by Jabil found that 74% of the respondents think cultural challenges are bigger than technology challenges for transformation.

e- Lights-out manufacturing refers to a situation where the entire production line is fully automated and the only role of people in the factory is for maintenance or repair purposes.

a modern semiconductor factory with all the associated manufacturing complexity is a marvel of automation via digitization. As semiconductor processes have grown more complex, the Operations component has grown more sophisticated over time.

Modern manufacturing processes have extensive time-window limits to manage yield (for example, to limit time between steps to avoid surface contamination). This has driven the need for more sophisticated decision systems tied around building a digital twin of the production line that can accurately predict how material will move downstream in the presence of probabilistic failure models, coupled with an optimization-based release policy that determines when lots can enter the critical time loops such that they have a high probability of making it through the process steps in time.

Refrences:

Book: Industrial Digital Transformation Accelerate digital transformation with business optimization AI and Industry 40 Shyam Varan Nath Ann Dunkin Mahesh Chowdhary

Course slides and presentations