**OPM6090 SIM 1: Disrupting Operations with AI: The Amazon Touch**

**CLO**

Digital Transformation and Decision Making

Building and Managing Disruptive Innovations

((CO.TO.1) Assess the technology architecture and infrastructure capabilities depending on various operating models.

(CO.TO.2) Assess the value proposition, including cost reduction and revenue generation, of integrating technology across operation functions.

(CO.TO.3) Evaluate how technology-savvy human capital drives technology adoption in operations management.

**Associated modules**

1: Overview of the Importance and Impact of Technology Across an Organization

2: The Intelligent Business: Mining and Mapping Capabilities within an Organization

3: Moving towards Industry 4.0

4: Decision Making for Driving Value Across an Operation

5: Technology Design and Assessment for Operational Efficiencies

6: Emerging Technology and Practices for Continuous Innovation

**Input idea/ BG info**

Amazon’s AI drive push is changing every operational aspect. Amazon’s Alexa AI is using voice recognition to learn about its customers’ shopping preferences, movie and music choices, and even ways to ensure fresh food quality for Amazon Fresh food delivery. Based on the case article, students can learn the steps a company has to take towards a successful digital transformation. What are the risks? (investing in technologies and acquiring companies without an end objective on how to leverage and integrate them)? How do you measure performance - (i) level of data integration and sharing (the flywheel approach); (ii) number of new products invented and marketed from digital transformation (iii) number of IP (intellectual property) created as patents and publications; (iv) increase in Amazon’s ability to predict what its customers want; (v) increase in Amazon’s ability to recommend its customer other products and services they will purchase (vi) use the information to increase Amazon’s knowledge on what to order from its suppliers, when to order them, and where to store them for efficient order fulfillment and delivery; (vii) level of innovative disruption on competitors (traditional retailers).

How can students learn from the impact of AI technologies on continuous operational improvements to (i) build best practices of using AI to change operations and (ii) assess the limitations and threats of AI from an over-reliance on technology and machine-learning?

Objectives:

Understand the role and decision-making behind technology choices and their impact on operations around the globe

Decide on how to align technology choices to a company’s product and service strategy

Course Competencies: (CO.TO 1-3)

Measures:

Choosing the right technology for the right strategic and tactical objectives.

Distinguish between the usefulness of technologies based on strategic, economic, and social contexts.

Inside Amazon's Artificial Intelligence Flywheel

<https://www.wired.com/story/amazon-artificial-intelligence-flywheel/>

**Storyboard**

|  |  |  |
| --- | --- | --- |
| Screen Title | OST | Notes for the Developer |
| Introduction | <https://www.shutterstock.com/image-photo/businessman-greeting-congratulating-new-smiling-executive-788459992?src=lBImnp6O4WrY0myKG3WFdg-1-27>  Below the image show a textbox with this information and a START button:  **TriaCON Mining & Constructions Ltd. is a start-up company owned by TriaCON Incorporated. It is based in Nairobi, Kenya and has been in operations since 2010.**  **It specializes in bidding for and fulfilling government contracts in construction. In recent times, the company has seen a rise in the cases of late and over budget construction projects.**  **Concerned about this, Paul Njuguna, CEO and President of TriaCON Mining & Constructions has reached out to your company, an AI start-up launched in 2018, to help mitigate this problem.**  **You have arrived at the office for an interview with Paul and Hasan Ali, who is TriaCON’s Regional Head for Sub-Saharan Africa.**  **If Paul and Hasan are satisfied with your answers to their questions, your company stands a chance of winning a contract to design an AI system to cater to their requirements. The introductions are done, and you are now into the actual interview.**  **Select START to begin.**  On selecting the START button, the learner goes to Scene 1. | [1] Go to Scene 1 |
| Scene 1 | Show a chat interface with images for the people in the conversation.  This is Paul:    [Edit: Crop image to get a smaller shot of just the head and shoulders and remove background details.]  <https://www.shutterstock.com/image-photo/confident-serious-businessman-suit-sitting-workplace-788459989?src=5r_KtqDQXuUefxPO15u3tA-1-21>  **Paul: Recently, we have had a spate of projects that are running late or over budget. How do you think AI can help us overcome this issue?**  **What should your response be?**   1. **I think this is more of a productivity issue. AI can definitely help you resolve that. [1]** 2. **We’d need to study where the problem areas are. That data would be very important to us. [2]** | [1] Go to Scene 2  [2] Go to Scene 3 |
| Scene 2 | Continue with the chat interface.  This is You:    [Edit: Crop image to get a smaller shot of just the head and shoulders and remove background details.]  <https://www.shutterstock.com/image-photo/serious-young-leader-suit-looking-camera-793409161?src=5r_KtqDQXuUefxPO15u3tA-1-33>  **You: I think this is more of a productivity issue. AI can definitely help you resolve that.**  This is Hasan:    [Edit: Crop image to get a smaller shot of just the head and shoulders and remove background details.]  <https://www.shutterstock.com/image-photo/young-talented-male-worker-looking-camera-1054168961?src=5r_KtqDQXuUefxPO15u3tA-2-87>  **Hasan: Well, I don’t wish to dispute what you are saying, but we have very competent managers handling our projects.**  **Paul: That’s right! Productivity is not the issue. We are really monitoring that minutely.**  **You seem to have got off to a bad start there! How would you recover from the situation?**   1. **In that case, I’m sure you have a lot of data that we could use to train** **our neural networks! That would make our job a lot easier! [1]** 2. **We’d need to study where the problem areas are. That data would be very important to us. [2]** | [1] Go to Scene 4  [2] Go to Scene 3 |
| Scene 3 | **You: We’d need to study where the problem areas are. That data would be very important to us.**  **Paul: I agree with you, there. We’d definitely need to understand which of our sub-projects are causing the problem. How do you propose we do this?**  **How would you respond?**   1. **We’ll have to inspect each sub-project to accurately identify the issues and obtain the data that we need. [1]** 2. **Use robots to capture 3D scans of construction sites and study them to identify the problem areas. [2]** | [1] Go to Scene 5  [2] Go to Scene 6 |
| Scene 4 | **You: I’m sure you are right when you say productivity is not the issue. I was just trying to preempt what the problem might be. Since you have been monitoring the processes, I’m sure you have a lot of data that we could use to train our neural networks! That would make our job a lot easier!**  **Paul: But how do we identify the sub-projects that are causing the problems?**  **How would you respond?**   1. **We’ll have to inspect each sub-project to accurately identify the issues and obtain the data that we need. [1]** 2. **Use robots to capture 3D scans of construction sites and study them to identify the problem areas. [2]** | [1] Go to Scene 5  [2] Go to Scene 6 |
| Scene 5 | **You: We’ll have to inspect each sub-project to accurately identify the issues and obtain the data that we need.**  **Hasan: Wow! We have projects all over the country! How do you propose that we study each one of them to identify the problem areas?**  **How would you respond?**   1. **Data is very important to us to feed to our neural networks. A data gathering exercise is unavoidable, however painful it might seem. [1]** 2. **Use robots to capture 3D scans of construction sites and study them to identify the problem areas. [2]** | [1] Go to Scene 7  [2] Go to Scene 6 |
| Scene 6 | **You: We could use robots to capture 3D scans of construction sites and study them to identify the problem areas. The data collected can be fed into a deep neural network that classifies how far along different sub-projects are.**  **Hasan: How will that help?**  **How would you like to respond?**   1. **This helps us have a reliable database on which we can create a solution for your problem. [1]** 2. **The scans can alert the management team if things seem off track and they could then step in to deal with small problems before they become major issues. [2]** | [1] Go to Scene 8  [2] Go to Scene 9 |
| Scene 7 | **You: Data is very important to us to feed to our neural networks. A data gathering exercise is unavoidable, however painful it might seem. But don’t worry. We’ll provide the manpower that is required to execute the task.**  **Hasan: Somehow, it doesn’t seem like a very smart way of doing things. Isn’t there a way to use technology to reduce the dependence on manpower?**  **You: Yes, there is. We could use robots to capture 3D scans of construction sites and study them to identify the problem areas. The data collected can be fed into a deep neural network that classifies how far along different sub-projects are.**  **Hasan: How will that help?**  **How would you like to respond?**   1. **This helps us have a reliable database on which we can create a solution for your problem. [1]** 2. **The scans can alert the management team if things seem off track and they could then step in to deal with small problems before they become major issues. [2]** | [1] Go to Scene 8  [2] Go to Scene 9 |
| Scene 8 | **You: This helps us have a reliable database on which we can create a solution for your problem.**  **Paul: Somehow, all the solutions that you are offering seem to be manpower-intensive!**  **Why do you think Paul is making this comment?**   1. **Paul is not convinced that AI is the best possible way to deal with the issue. [1]** 2. **Paul is looking for a solution that is more technologically driven and does not depend on manpower. [2]** | [1] Go to Scene 10  [2] Go to Scene 11 |
| Scene 9 | **You: The scans can alert the management team if things seem off track and they could then step in to deal with small problems before they become major issues.**  **Hasan: That sound like a solid idea! If we are able to identify problem areas early, we may be able to resolve them before they go out of control.**  **What are your thoughts on Hasan’s comments?**   1. **Hasan has made up his mind to give you the project [1]** 2. **Hasan is looking for a solution that is more technologically driven and does not depend on manpower. [2]** | [1] Go to scene 12  [2] Go to Scene 11 |
| Scene 10 | **You: Looks like you are not too convinced about AI’s ability to deal with your problems.**  **Paul: I wouldn’t say that. I am just not entirely convinced that your company is capable of handling this project.**  **How would you respond?**   1. **Give Paul a detailed summary of the work that your company has done in AI. [1]** 2. **Let him know that you understand that he is looking for a solution that is more technologically driven and does not depend on manpower. [2]** | [1] Go to Scene 13  [2] Go to Scene 11 |
| Scene 11 | **You: I understand that you are looking for a solution that is more technologically driven and does not depend on manpower.**  **Paul: That’s correct!**  **You: We could use robots to capture 3D scans of construction sites and study them to identify the problem areas. The data collected can be fed into a deep neural network that classifies how far along different sub-projects are.**  **Paul: and how’d that help?**  **You: The scans can alert the management team if things seem off track and they could then step in to deal with small problems before they become major issues.**  **Hasan: That sound like a solid idea! If we are able to identify problem areas early, we may be able to resolve them before they go out of control.**  Button: Next [1] | [1] Go to Scene 14 |
| Scene 12 | **You: Looks like you are totally convinced about our abilities to handle your problems!**  **Hasan: Hey! Not so fast. I just want to make sure that the solution is more technologically driven and less dependent on manpower.**  **You: I totally understand. That’s exactly what AI could do for you.**  Button: Next [1] | [1] Go to scene 14 |
| Scene 13 | **You: I’m surprised that you doubt our abilities! We have successfully executed several projects…**  **Paul: Hey! Hold on! I have already read up all about he projects your company has handled. I just want to make sure that the solution is more technologically driven and less dependent on manpower.**  **You: I totally understand. That’s exactly what AI could do for you.**  Button: Next [1] | [1] Go to scene 14 |
| Scene 14 | **Hasan: You spoke about productivity being a possible issue earlier on. We don’t agree, but if it were, how would AI help us mitigate the issue?**  **How would you respond? [There could be more than one correct option]**   1. **Self-driving construction machinery can perform repetitive tasks more efficiently than their human counterparts. [1]** 2. **Autonomous or semi-autonomous machinery can prepare a job site with the help of a human programmer to exact specifications. [2]** 3. **Project managers can track job site work in real time using AI. [3]**   Button: Next [4] | [1] Go to Scene 15  [2] Go to Scene 16  [3] Go to Scene 17  [4] Go to Scene 18 |
| Scene 15 | **You: Self-driving construction machinery can perform repetitive tasks, such as pouring concrete, bricklaying, welding, and demolition, more efficiently than their human counterparts. This will improve** **productivity overall.**  **Hasan: That sounds exciting! But is that all?**  Button: Back [1] | [1] Go to Scene 14 |
| Scene 16 | **You: Autonomous or semi-autonomous machinery can prepare a job site with the help of a human programmer to exact specifications.**  **Paul: How does that help?**  **You: This frees up human workers for the construction work itself and reduces the overall time required to complete the project.**  **Paul: Oh! I see. What else?**  Button: Back [1] | [1] Go to Scene 14 |
| Scene 17 | **You: Project managers can track job site work in real time using AI.**  **Hasan: How?**  **You: They can use facial recognition, onsite cameras, and similar technologies to assess worker productivity and conformance to procedures.**  **Hasan: Ok. That sounds good. Is that all?**  Button: Back [1] | [1] Go to Scene 14 |
| Scene 18 | **Paul: All this sounds really good. But what about safety? Can AI help with construction safety?**  **How would you respond?**   1. **AI can be used to analyze photos from job sites and scan them for safety hazards. [1]** 2. **AI can be used to compute risk ratings for projects. [2]**   Button: Next [3] | [1] Go to Scene 19  [2] Go to Scene 20  [3] Go to Scene 21 |
| Scene 19 | **You: We can develop an algorithm that analyzes photos from your job sites and scan them for safety hazards such as workers not wearing protective equipment. This can then be correlated with accident records.**  **Hasan: That’s exciting! What else?**  Button: Back [1] | [1] Go to Scene 18 |
| Scene 20 | **You: We can develop an algorithm that analyzes photos from your job sites and scan them for safety hazards such as workers not wearing protective equipment. This can then be correlated with accident records and compute risk ratings for projects.**  **Paul: And how would we use that information?**  **You: You could hold safety briefings when an elevated threat is detected.**  Button: Next [1] | [1] Go to Scene 21 |
| Scene 21 | **Hasan: Labor shortages also contribute to lower productivity. I can see how AI can help us replace manpower with intelligent machines. But, could you elaborate a little on that?**  **How would you respond?**   1. **AI and machine learning can help better plan the distribution of labor and machinery across jobs. [1]** 2. **Project managers can tell instantly which job sites do not have enough workers and equipment to complete the project on schedule. [2]**   Button: Next [3] | [1] Go to Scene 22  [2] Go to Scene 23  [3] Go to Scene 24 |
| Scene 22 | **You: AI and machine learning can help better plan the distribution of labor and machinery across jobs. Construction firms, such as yours, could boost productivity significantly through real-time analysis of data.**  **Paul: Sounds good!**  Button: Back [1] | [1] Go to Scene 21 |
| Scene 23 | **You: A robot constantly evaluating job progress and the location of workers and equipment enables project managers to tell instantly which job sites have enough workers and equipment to complete the project on schedule, and which might be falling behind where additional labor could be deployed.**  **Hasan: Great!**  Button: Back [1] | [1] Go to Scene 21 |
| Scene 24 | **Hasan: This is very exciting! I wonder, however, if other departments in our company, such as the production units that manufacture the equipment or our sales teams could benefit from the data collected at the job sites.**  **How would you like to respond?**   1. **Big data is usually beneficial only to the departments that are the source of the data. [1]** 2. **Construction industry professionals across departments can analyze and benefit from the insights generated from the data collected at job sites with the help of AI and machine learning systems. [2]** | [1] Go to Scene 25  [2] Go to Scene 26 |
| Scene 25 | **You: Unfortunately, this is a limitation of AI. Big data is usually beneficial only to the departments that are the source of the data. This data can be used to train the machines that are used for the construction, for example, but may not be useful information for the production department.**  **Paul: But, if, like you said, project managers are able to keep track of shortage of equipment at particular sites, would they not be able to pass this information on to the production department?**  **You: Yes, they could.**  **Hasan: Couldn’t you write algorithms to pass this information to the other departments automatically, without manual intervention?**  **You: Yes, that would be possible.**  **Hasan: Oh! So, we can use an approach similar to Amazon’s flywheel approach [1] to share data across departments! Wow, this is really the clincher as far as we are concerned.**  Button: Conclusion [2] | [1] open this link in a pop-up window: <https://www.wired.com/story/amazon-artificial-intelligence-flywheel/>  [2] Go to Scene 27 |
| Scene 26 | **You: Actually, yes. Construction industry professionals across departments can analyze and benefit from the insights generated from the data collected at job sites with the help of AI and machine learning systems.**  **Paul: Could you please elaborate?**  **You: For example, since project managers can track of shortage of equipment at particular sites, they would be able to pass this information on to the production department. We could then write algorithms to pass this information to the other departments automatically, without manual intervention.**  **Hasan: Oh! So, we can use an approach similar to Amazon’s flywheel approach [1] to share data across departments! Wow, this is really the clincher as far as we are concerned.**  Button: Conclusion [2] | [1] open this link in a pop-up window: <https://www.wired.com/story/amazon-artificial-intelligence-flywheel/>  [2] Go to Scene 27 |
| Scene 27 | **Here’s a summary of what you learned in this SIM:**   1. **AI can reduce building costs considerably.** 2. **Robots can use cameras to track the work as it progresses. This data can be used to train machines to plan the construction processes better.** 3. **Companies use AI to develop safety systems for worksites.** 4. **AI is being used to track the real-time interactions of workers, machinery, and objects on the site and alert supervisors of potential safety issues, construction errors, and productivity issues.** 5. **AI can be used to alter business models in the construction industry, reduce expensive errors, reduce worksite injuries, and make building operations more efficient.**   Button: End [1] | [1] End SIM |
| (Exit screen) | ***You have successfully completed this simulation.***  Show the Exit OST above. |  |