**Identify the product options**

1. IoT enables devices to gather and then relay information for data analysis
2. Smart devices are equipped with sensors that collect data
3. A few common sensors:
   1. Environmental sensors that capture temperature and humidity levels
   2. Barcode, QR code, or optical character recognition (OCR) scanners
   3. Geo-location and proximity sensors
   4. Accelerometer and tilt sensors
   5. Flow, level, and pressure sensors
   6. etc
4. Using Azure IoT services, devices with sensors can connect to the internet and send data via a message
5. Message's data is then collected and aggregated, and it can be converted into reports and alerts

## **Azure IoT Hub**

1. Is a managed service that's hosted in the cloud and that acts as a central message hub for bi-directional communication between your IoT application and the devices it manages
2. You can connect virtually any device to your IoT hub
3. Supports communications both from the device to the cloud and from the cloud to the device
4. Supports multiple messaging patterns:
   1. Device-to-cloud telemetry
   2. File upload from devices
   3. Request-reply methods
5. From a cloud-to-device perspective, IoT Hub allows for command and control. This means either manual or automated remote control
6. Track events such as device creation, device failures, and device connections

## **Azure IoT Central**

1. Builds on top of IoT Hub, by adding a dashboard that allows you to connect, monitor, and manage your IoT devices
2. User interface (UI) makes it easy to quickly connect new devices
3. You can watch the overall performance across all devices, set up alerts and push firmware updates.
4. To help you get up and running quickly, IoT Central provides starter templates
5. You then customize the design starter templates
6. You can use the UI to control your devices remotely

## **Azure Sphere**

1. Creates an end-to-end, highly secure IoT solution
2. For customers that encompasses everything from the hardware and operating system on the device
3. Azure Sphere has built-in communication and security features for internet-connected devices
4. Azure Sphere comes in three parts:
   1. **Azure Sphere micro-controller unit (MCU):** responsible for processing the operating system and signals from attached sensors
   2. **Customized Linux operating system (OS):** Handles communication with the security service
   3. The third part is Azure Sphere Security Service, also known as AS3. Makes sure that the device has not been maliciously compromised. When the device attempts to connect to Azure, it first must authenticate itself, using certificate-based authentication. AS3 checks to ensure that the device hasn't been tampered with.

# Analyze the decision criteria

## **Is it critical to ensure that the device is not compromised?**

1. YES, because no manufacturers or customers want their devices to be maliciously compromised
2. When security is a critical consideration in your product's design, the best product option is Azure Sphere
3. Azure Sphere ensures a secure channel of communication between the device and Azure by controlling everything from the hardware to the operating system and the authentication process
4. This ensures that the integrity of the device is uncompromised

## **Do I need a dashboard for reporting and management?**

1. If you merely want to connect to your remote devices to receive telemetry and occasionally push updates then you can implement Azure IoT Hub by itself
2. However, if you want a pre-built customizable user interface with which you can view and control your devices remotely, you might prefer to start with IoT Central
3. IoT Central integrates with many different Azure products, including IoT Hub, to create a dashboard with reports and management features.

# Use IoT Hub

1. **Scenario:** The devices will not require remote control. They will merely be sending their telemetry data for analysis and pro-active maintenance

## **Which service should you choose?**

1. It's preferable, but not critical, that the devices aren't compromised - No
2. Do I need a dashboard for reporting and management? – No
3. So, given the responses to the decision criteria, Azure IoT Hub is the best choice in this scenario. IoT Central is not needed

## **Why not use Azure IoT Central?**

1. Azure IoT Central provides a dashboard that allows companies to manage IoT devices individually and an aggregate, view reports, and set up error notifications via a GUI
2. In this scenario, Tailwind Traders wants to integrate the telemetry it collects

## **Why not use Azure Sphere?**

1. Azure Sphere provides a complete solution for scenarios where security is critical
2. In this scenario, security is preferred but not critical

# Use IoT Central

1. **Scenario**: The company is looking for a complete logistics solution that takes data sent from an onboard vehicle computer and turns it into actionable information
2. Furthermore, shipments can be outfitted with sensors from a third-party vendor to collect and monitor ambient conditions.
3. The company would prefer a **pre-built solution** to collect the sensor and vehicle computer data, and provide a **graphical user interface** that displays **reports** about shipments and vehicles

## **Which service should you choose?**

1. Does Tailwind Traders need a dashboard for reporting and management? Yes, a reporting and management dashboard is a requirement.

## **Why not use IoT Hub?**

1. The company would need to do a lot of custom development to build its own cloud-based dashboards and management systems on top of Azure IoT Hub.

## **Why not use Azure Sphere?**

1. Azure Sphere provides a complete solution for scenarios where security is critical
2. In this scenario, security is ideal, but not a critical priority

# Use Azure Sphere

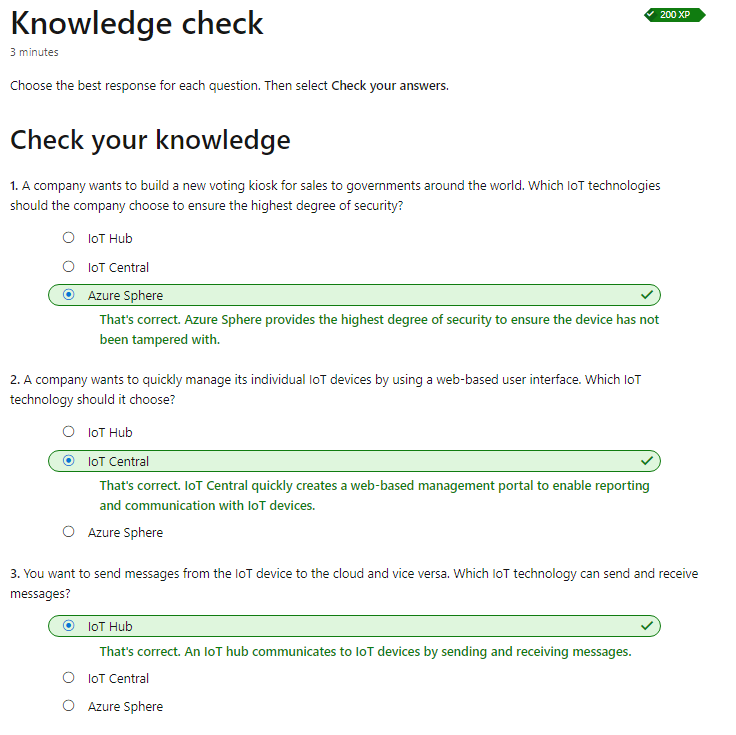
1. Tailwind Traders wants to implement a touchless point-of-sale solution for self-checkout. The self-checkout terminals should be, above all else, **secure**
2. Each terminal must be impervious to malicious code that could create fraudulent transactions

## **Which service should you choose?**

1. First, is it critical to ensure that the device or, in this case, each point-of-sale terminal, is not compromised? Absolutely
2. Next, does Tailwind Traders need a dashboard for reporting and management? Yes, the company requires a reporting and management dashboard
3. So, given the responses to the decision criteria, the IoT engineering firm will build a platform on top of both Azure IoT Central and Azure Sphere

## **Why not choose IoT Hub?**

1. By using IoT Central, Tailwind Traders would actually be using Azure IoT Hub behind the scenes as well



# Identify the product options

1. AI is a broad classification of computing that allows a software system to perceive its environment and take action
2. A goal of AI is to create a software system that's able to adapt, or learn something on its own
3. There are two basic approaches to AI:
   1. Deep learning system that's modeled on the neural network of the human mind
   2. Machine learning, a data science technique that uses existing data to train a model, test it, and then apply the model

## **Azure product options**

1. Three primary product offerings:
   1. **Azure Machine Learning:** Is a platform for making predictions. Consists of tools and services that allow you to connect to data to train and test models to find one that will most accurately predict a future result. After you've run experiments to test the model, you can deploy and use it in real time via a web API endpoint. Choose Azure Machine Learning when your data scientists need complete control over the design and training of an algorithm using your own data With Azure Machine Learning, you can:
      1. Create a process that defines how to obtain, handle and split data
      2. Train and evaluate predictive models by using tools and programming language
      3. Create pipelines
      4. Deploy the best-performing algorithm as an API
   2. **Azure Cognitive Services:** Provides prebuilt machine learning models that enable applications to see, hear, speak, understand, and even begin to reason.  Use Azure Cognitive Services to solve general problems, such as analyzing text for emotional sentiment or analyzing images to recognize objects or faces.  You don't need special machine learning or data science knowledge to use these services. Azure Cognitive Services can be divided into the following categories:
      1. **Language**
      2. **Speech**
      3. **Vision**
      4. **Decision**
   3. **Azure Bot Service:** Creating virtual agents that understand and reply to questions just like a human.  Azure Bot Service is a bit different from Azure Machine Learning and Azure Cognitive Services in that it has a specific use case. The bot you build uses other Azure services, such as Azure Cognitive Services, to understand what their human counterparts are asking for.

# Analyze the decision criteria

1. Are you building a virtual agent that interfaces with humans via natural language? - **Azure Bot Service**
2. Do you need a service that can understand the content and meaning of images, video, or audio, or that can translate text into a different language? - **Use Azure Cognitive Services**
3. Do you need to predict user behavior or provide users with personalized recommendations in your app? - **Azure Cognitive Services Personalizer**
4. Will your app predict future outcomes based on private historical data? **Azure Machine Learning**
5. Do you need to build a model by using your own data or perform a different task than those listed above? **Azure Machine Learning with deep learning**

# Use Machine Learning for decision support systems

1. **Scenario:** e-commerce website allows its customers to browse and purchase items that can be delivered or picked up from a retail store nearest to their location. The Marketing team is convinced that it can increase sales dramatically by suggesting add-on products that complement the items in a shopper's cart at the point of checkout. Additionally, the suggestions could be influenced by product availability, product profitability, and other factors.

## **Which service should you choose?**

1. Is Tailwind Traders building a virtual agent that interfaces with humans via natural language? No
2. Second, does Tailwind Traders need a service that can understand the content and meaning of images, video, audio, or translate text into a different language? No
3. Third, does Tailwind Traders need to predict user behavior or provide users with personalized recommendations? Yes
4. Fourth, will the Tailwind Traders app predict future outcomes based on private historical data? Yes
5. Finally, it sounds like the Marketing team already employs some data science experts, and the team is willing to make at least a year-long commitment to building, testing, and tweaking the models to be used.

# Use Cognitive Services for data analysis

1. **Scenario:** With the company website, only 80% of the customers speak English. The team sees the addition of multiple languages as a wonderful opportunity to serve non-English speakers with the same online e-commerce experience as English speakers.

## **Which service should you choose?**

1. First, is Tailwind Traders building a virtual agent that interfaces with humans via natural language? No
2. Second, does Tailwind Traders need a service that can understand the content and meaning of images, video, audio, or translate text into a different language? Yes
3. Third, does Tailwind Traders need to predict user behavior or provide users with personalized recommendations? No
4. Finally, will the Tailwind Traders app need to predict future outcomes based on private historical data? No

# Use Bot Service for interactive chat experiences

1. The Customer Service team has long asked for a virtual agent to handle the vast majority of questions it gets asked. The team wants shoppers to feel as though they're interacting with a real human. When it becomes clear that the virtual agent can't provide an answer, the chat session should be transferred to a human.

## **Which service should you choose?**

1. First, is Tailwind Traders building a virtual agent that interfaces with humans via natural language? Yes
2. Second, does Tailwind Traders need a service that can understand the content and meaning of images, video, audio, or translate text into a different language? Possibly, yes
3. Third, does Tailwind Traders need to predict user behavior or provide users with personalized recommendations? No
4. Finally, will the Tailwind Traders app need to predict future outcomes based on private historical data? No

