Problem Statement

The project aims to develop a computer vision system that detects and ensures warehouse employees' compliance with safety gear requirements, such as helmets and vests, by analyzing real-time video feeds. The system's effectiveness will be measured by achieving a 98% detection accuracy, generating alerts within 2 seconds, and reducing safety gear violations by 90% post-deployment. With a realistic timeline of 6 months, leveraging pre-trained models and existing camera infrastructure, the project is designed to be achievable and scalable across different warehouse environments while ensuring adherence to safety and privacy standards.

1. Context
   This project aims to develop a computer vision system to automatically detect whether warehouse employees are wearing required safety gear, such as helmets and vests, using real-time video feeds. It generates instant alerts for non-compliance, enhancing safety and ensuring adherence to regulations in busy warehouse environments.

2. Criteria for success
   Success for this project will be measured by achieving a 98% accuracy rate in detecting safety gear on employees, generating real-time alerts within 2 seconds of non-compliance detection, and achieving a 90% reduction in safety violations post-deployment. Additionally, the system's effectiveness will be assessed through user satisfaction, with a target of 85% of warehouse supervisors finding the system effective and easy to use, based on feedback gathered through surveys.

3. Scope of solution space
   The project will develop a computer vision system using real-time video data from warehouse cameras to detect and monitor employee compliance with safety gear requirements, specifically helmets and vests. The system will generate instant alerts for non-compliance, provide a dashboard for supervisors to review incidents and generate reports, and operate efficiently on edge devices for scalability. It will not monitor employee productivity, track non-visual safety protocols, replace human judgment in complex situations, or store personally identifiable information beyond what's necessary for detecting safety gear.

4. Constraints within solution space
   Some of the potential constraints are the privacy concerns related to training images as well as to video used for detection.

5. Stakeholders to provide key insight
   David Lara - Chief Data Scientist

6. Key data sources
   https://www.kaggle.com/datasets/khananikrahman/is-an-employee-wearing-safety-gear

https://www.kaggle.com/datasets/ahmadahmadzada/images2000

https://www.kaggle.com/datasets/whenamancodes/helmet-detection-at-work-for-safety?select=images
https://www.kaggle.com/datasets/niravnaik/safety-helmet-and-reflective-jacket
https://www.kaggle.com/datasets/andrewmvd/hard-hat-detection