# Machine Learning Model Deployment with IBM Cloud Watson Studio **Prediction Model Deployment**

Phase 5 submission

Design Thinking Process:

1. Empathize: Understand the customer's pain points and gather user feedback.
2. Define: Define the problem, target metrics, and the desired outcome.
3. Ideate: Brainstorm potential solutions and data sources for predicting churn.
4. Prototype: Create a preliminary model and test it with sample data.
5. Test: Validate the prototype with real data and iterate as needed.
6. Implement: Develop the final model and deployment plan.

Development Phases:

1. Data Collection: Gather historical customer data, including demographics, usage patterns, and churn status.
2. Data Preprocessing: Clean and prepare the data, handle missing values, and encode categorical variables.
3. Feature Engineering: Create relevant features such as customer tenure, usage frequency, and customer support interactions.
4. Dataset Selection: Choose the appropriate dataset for model training, validation, and testing.
5. Model Selection: Select a suitable machine learning algorithm (e.g., logistic regression, random forest, or neural networks) for churn prediction.
6. Model Training: Train the selected model on the training dataset, tune hyperparameters, and validate its performance.
7. Deployment: Deploy the trained model on a production server for real-time predictions.
8. Integration: Integrate the model with the business application and data pipelines.
9. Monitoring: Continuously monitor the model's performance and retrain it as necessary.

Predictive Use Case: The predictive use case is customer churn prediction. The model will analyze customer data and predict the likelihood of a customer canceling their subscription in the near future.

Dataset Selection: A dataset containing historical customer information, including customer attributes, usage data, and churn status, is selected for training and validation.

Model Training: The selected machine learning model is trained on the training dataset. The model is evaluated using appropriate evaluation metrics (e.g., accuracy, precision, recall) and tuned for optimal performance.

Deployment Process: The trained model is deployed on a production server using a suitable framework or platform (e.g., Docker, AWS Lambda). It is made available via an API for real-time predictions.

Integration Steps: The model is integrated into the business application through API endpoints. Data from users is sent to the model, and the model's predictions are used to trigger retention strategies.

Accessing and Utilizing the Deployed Model:

1. Real-time Predictions: The deployed model can be accessed through API endpoints. Users can send customer data to these endpoints to get real-time churn predictions.
2. Decision Support: The model's predictions can be integrated into the company's customer relationship management (CRM) system to provide insights to customer support teams.
3. Proactive Actions: The model's predictions can trigger automated actions, such as sending personalized offers or alerts to at-risk customers.
4. Reporting: The model's predictions and performance metrics can be visualized through dashboards for monitoring and decision-making.

Overall, this project follows a design thinking approach, involves data collection, preprocessing, model training, and deployment, and offers real-time access to predictions for effective customer churn management