# **Employee Attrition Prediction**

## **Key Observations & Insights**

### **High-Risk Attrition Factors**

* **Demographics**: Young employees (28-32) have highest attrition rates (25%+)
* **Work Conditions**: Overtime is a major factor (30.5% vs 10.4%)
* **Job Roles**: Sales Representatives (39.8%) and Lab Technicians (23.9%) leave most frequently
* **Personal Factors**: Single employees (25.5%) leave more than married (12.5%)
* **Travel Impact**: Frequent travelers show 24.9% attrition vs 8.0% for non-travelers

### **Key Model Insights**

* Linear models (SVM, Logistic Regression) outperform complex models (AUC 0.818)
* Top attrition predictors:
  1. Overtime (2.9x higher risk)
  2. Department (R&D and Sales)
  3. Business travel frequency
  4. Monthly income (strongest for younger employees)
  5. Job satisfaction and work-life balance

### **Implementation Challenges**

* Significant class imbalance (16% attrition / 84% retention)
* Many interrelated factors requiring careful feature engineering
* Customized threshold needed for practical application (0.35 vs standard 0.5)
* Risk level calibration to prioritize interventions

### **Conclusions & Business Value**

* **Prediction Accuracy**: Model identifies high-risk employees with 82% AUC
* **Actionable Findings**:
  1. Review overtime policies (highest impact opportunity)
  2. Develop targeted career paths for Sales and Lab Technician roles
  3. Address compensation for younger, high-skill employees
  4. Implement work-life balance initiatives for frequent travelers
  5. Create early warning system based on satisfaction metrics decline
* **Implementation Strategy**: 3-tier risk categorization enables prioritized retention efforts