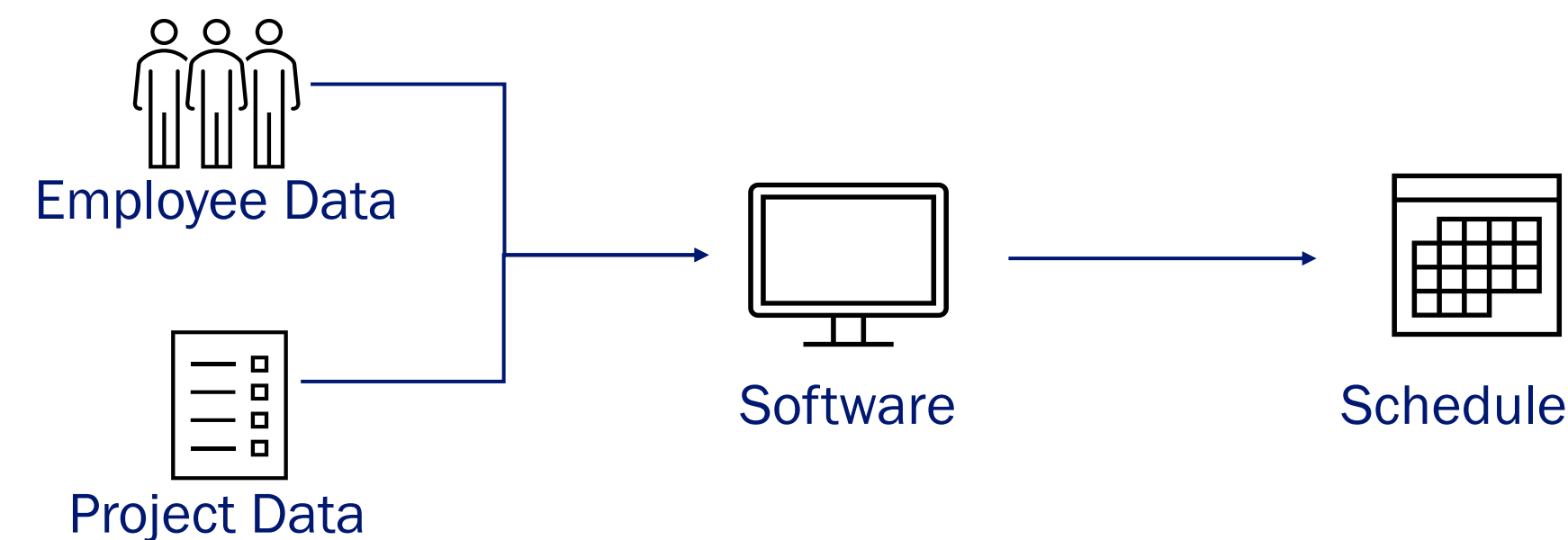


Background

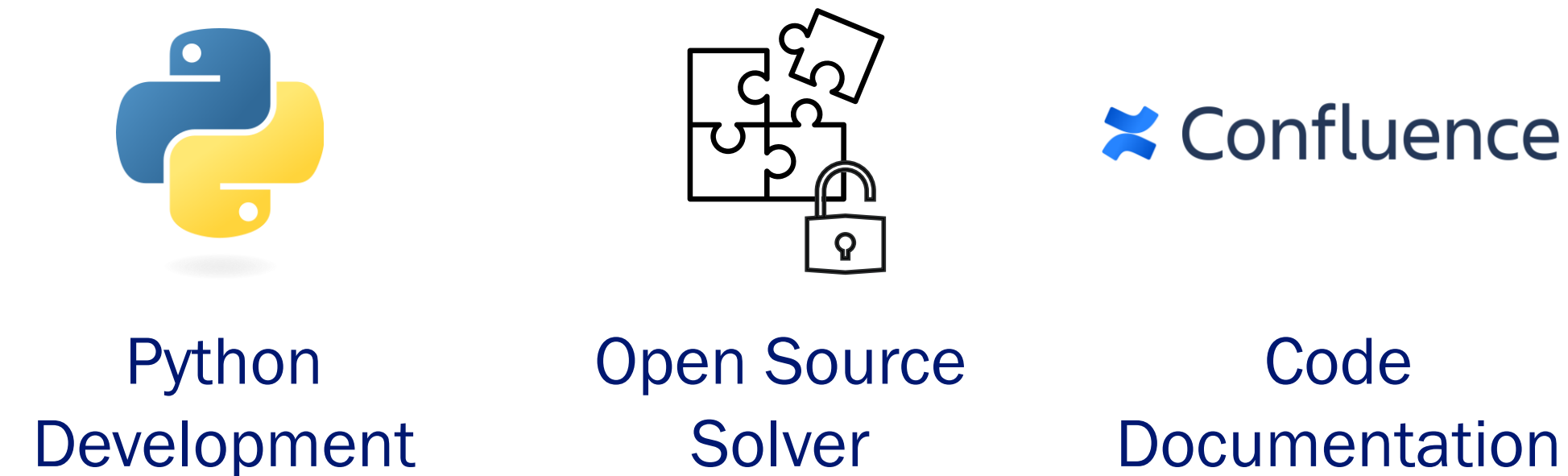
Client
Technology and innovation studio that develops tools for the company based on business needs or industry potential.

Problem
Common ad hoc project assignment produces schedules that result in large project time horizons, ineffective use of employees, and/or flawed project sequences.

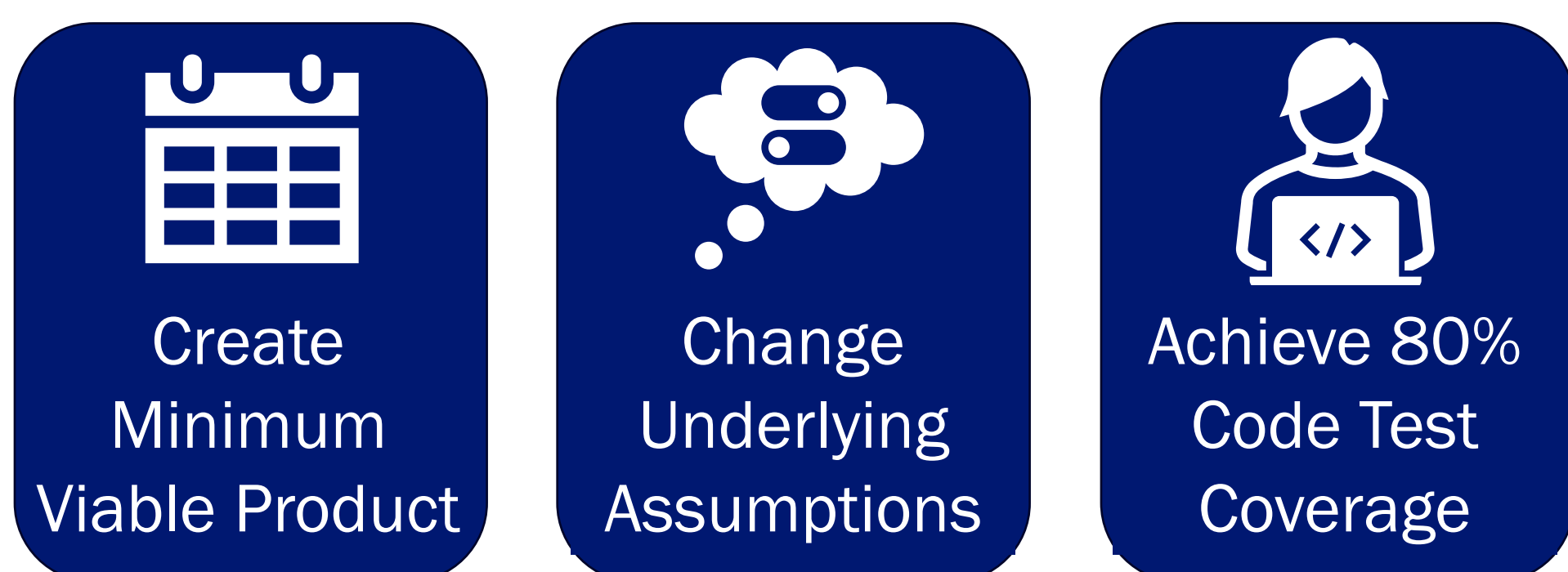
Final Deliverable
LMI is seeking software that efficiently assigns employees to projects based on project requirements and employee skills.



Product Requirements



Objectives



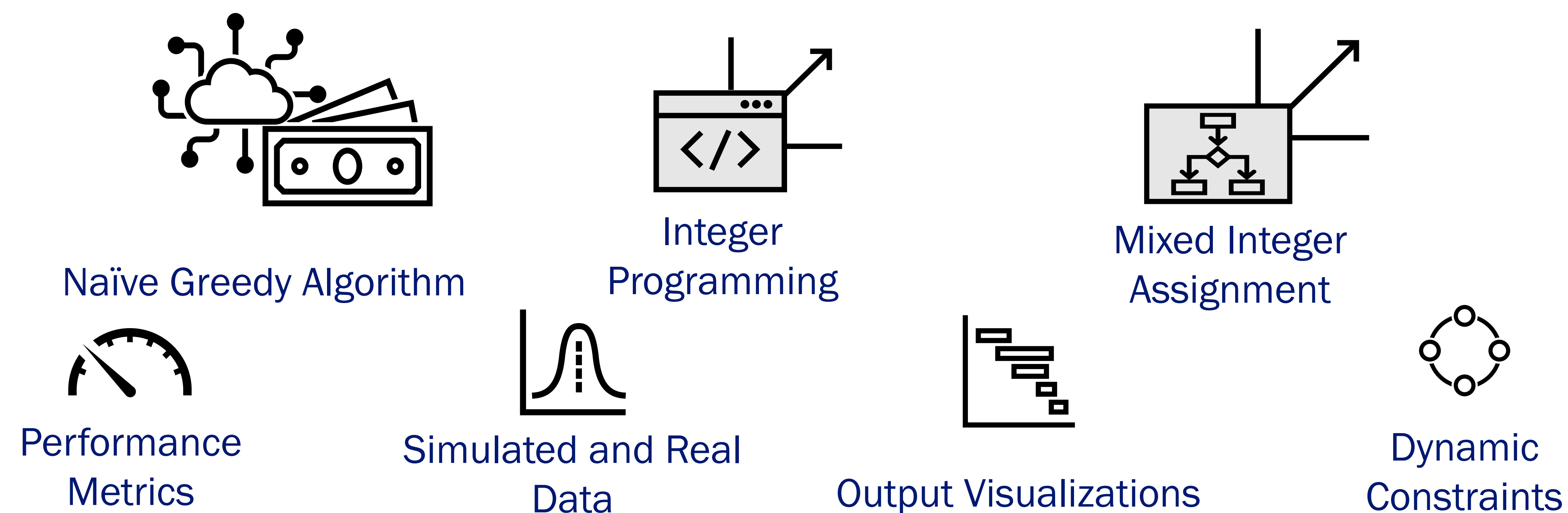
Design Methodology



Solution Design

Design Milestones	Goals
Baseline Metrics	Approximate the current process and define performance metrics.
Minimum Viable Product	Assign personnel to projects using integer values.
Partial Objects	Allow employees to concurrently work on multiple projects.
Scalability	Experiment with the model using datasets of varying sizes.
Sensitivity Analysis	Examine model solutions with stochastic project durations.
Compare Solvers	Assess different problem-solving approaches.

Solution Features



Solution Evaluation

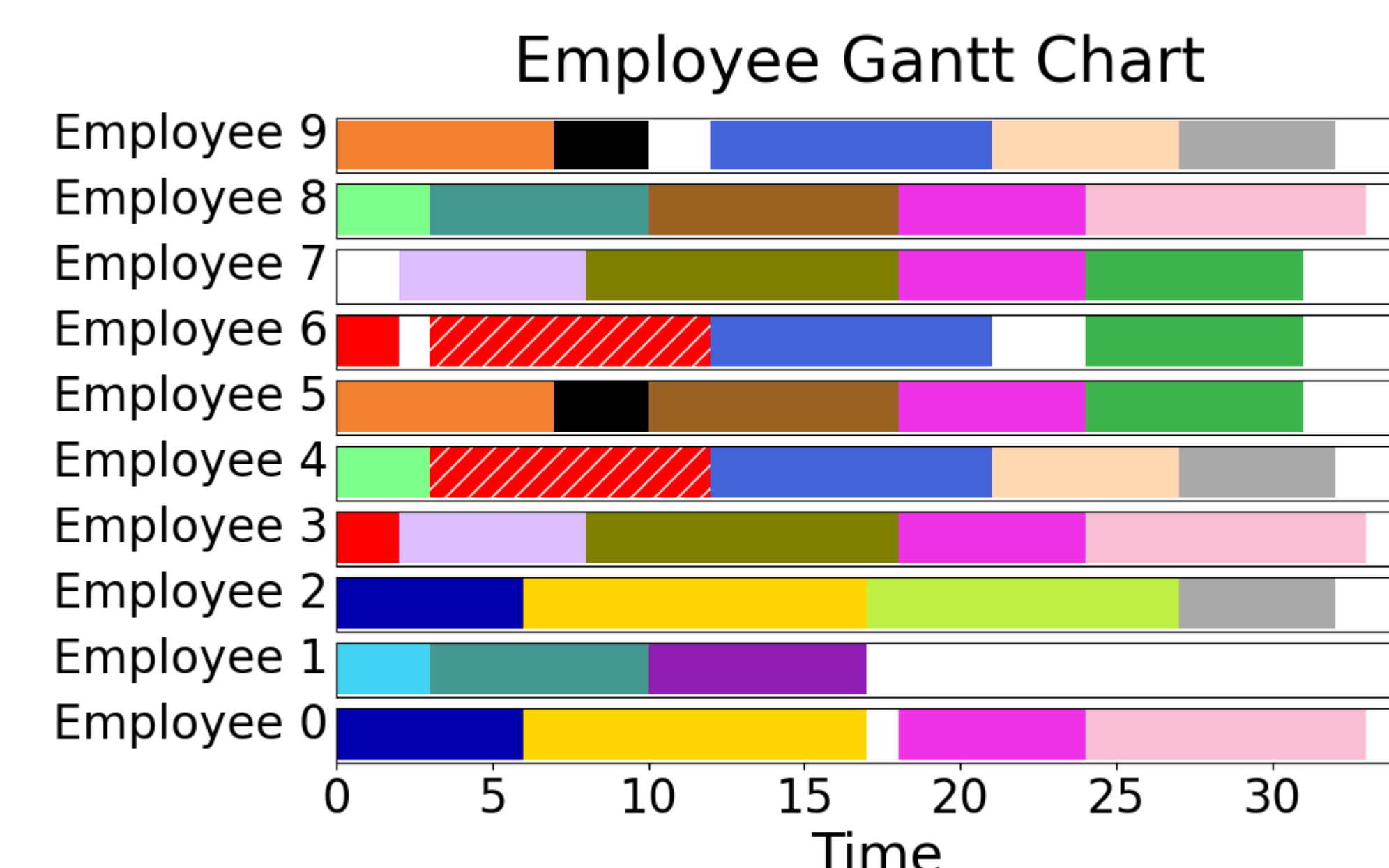
The solution outputs a Gantt chart that shows the employee schedule, employee utilization, and the length of the project time horizon.

Project Time Horizon	Average Employee Utilization
33	89.7 %

The objective function goal is to minimize the start time of high priority projects. Smaller objective function values are desired.

The table below compares the objective value and runtime obtained with the open-source solver GLPK to that of commercial solver Gurobi to evaluate the scalability of our product. From this we see our solution produces better solutions for small scale problems and has the potential to do better with longer solve time.

Methods	Gurobi		Naïve Greedy Algorithm		GLPK	
	Objective	Runtime	Objective	Runtime	Objective	Runtime
Small	180	3600	413	0.11	410	3600
Medium	316	3600	1077	0.21	2543	3600
Large	752	3600	3636	0.44	DNF	3600



Results

- Delivered a New Workforce Analytics Tool
- Achieved 82% Test Coverage
- Saved Managerial Time
- Developed Models to Complete Project Assignment Tasks
- Created Data Driven Approach

Impact

- \$63,000** in Labor Cost Savings
- \$14,000 Per deployment** in Commercial Solver Savings
- \$1.51 Billion TAM** of Workforce Analytics Industry
- Up to 20% Increase** of Average Employee Utilization
- Up to 30% Decrease** of Average Project Time Horizon

Future Work

- Develop heuristics to reduce solver runtime
- Sensitivity analysis of project duration for foundation of robust optimization model