

Problem Description

The wafer probe testing process requires multiple wafers from different groups to be tested within a week. Planning is needed to determine if testing capacity can meet demand. However, the current manual process for determining weekly tool requirements is inefficient, prone to human error, and leads to sub-optimal resource allocation. Additionally, performing what-if analysis is challenging and time-consuming, limiting effective planning and decision-making.

Objective

Our aim is to automate and streamline the weekly planning process for the probe manufacturing team by developing a solution that optimizes tool allocation, reduces human error, and enhances decision-making through efficient capacity planning and what-if analysis. This solution will improve forecasting, scheduling, and resource alignment while supporting data-driven decision-making.

Tech Stack

Data Loading
& Modelling



Database



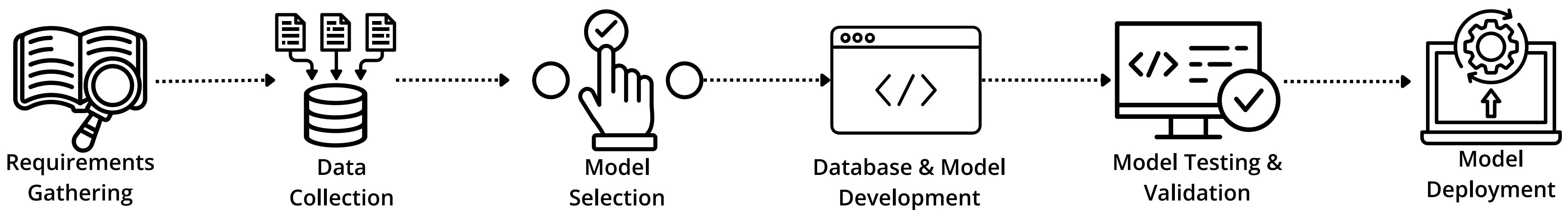
GUI
Interface



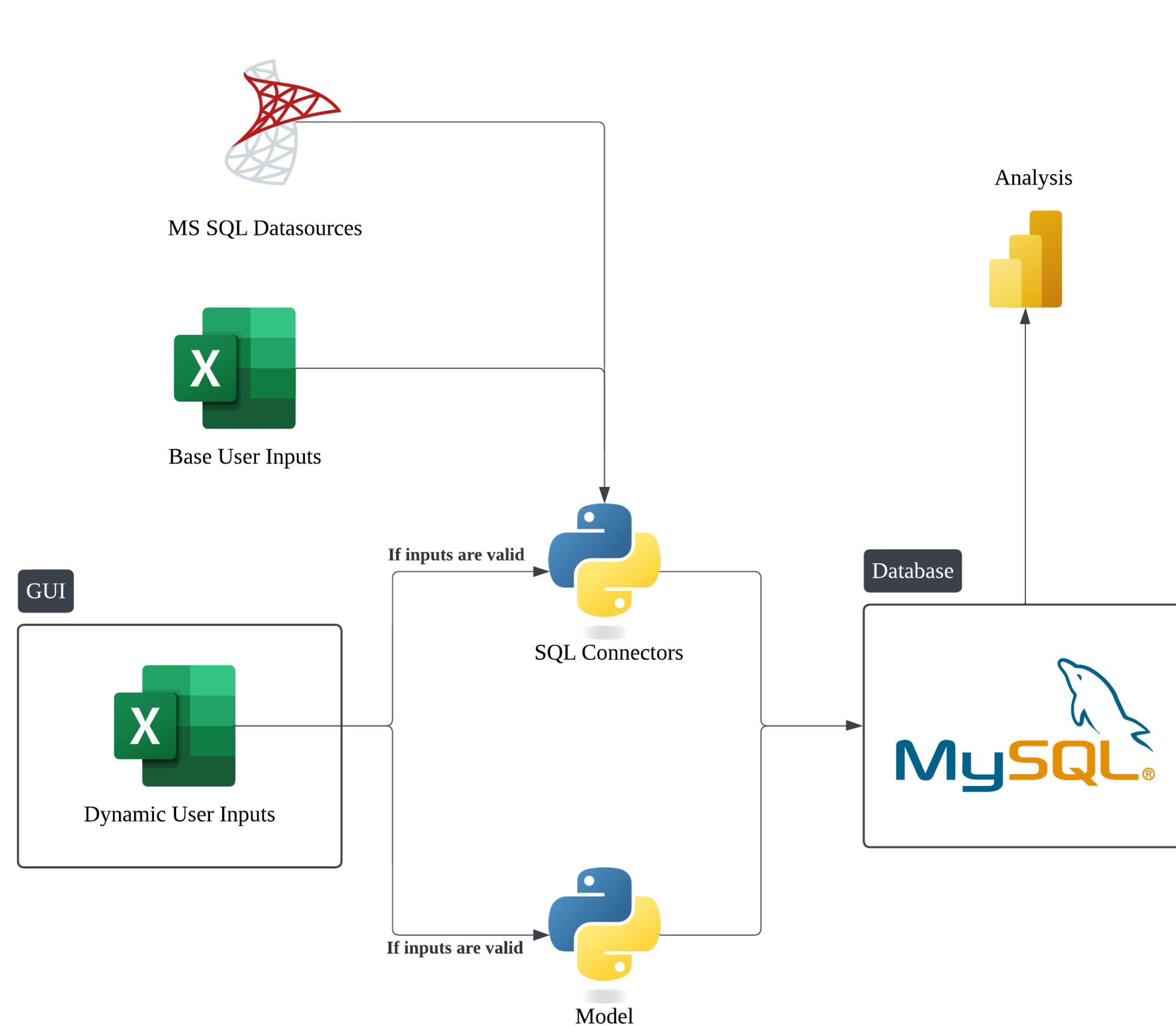
Visualization



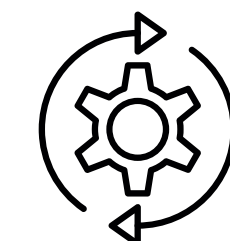
Methodology



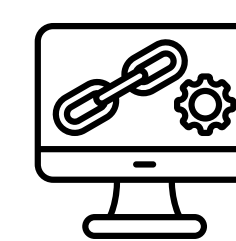
Solution Architecture



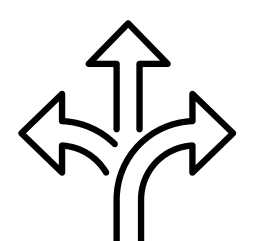
Frontend



Automated



Robust



Flexible

Simulation Name: TestTimeAdjustment

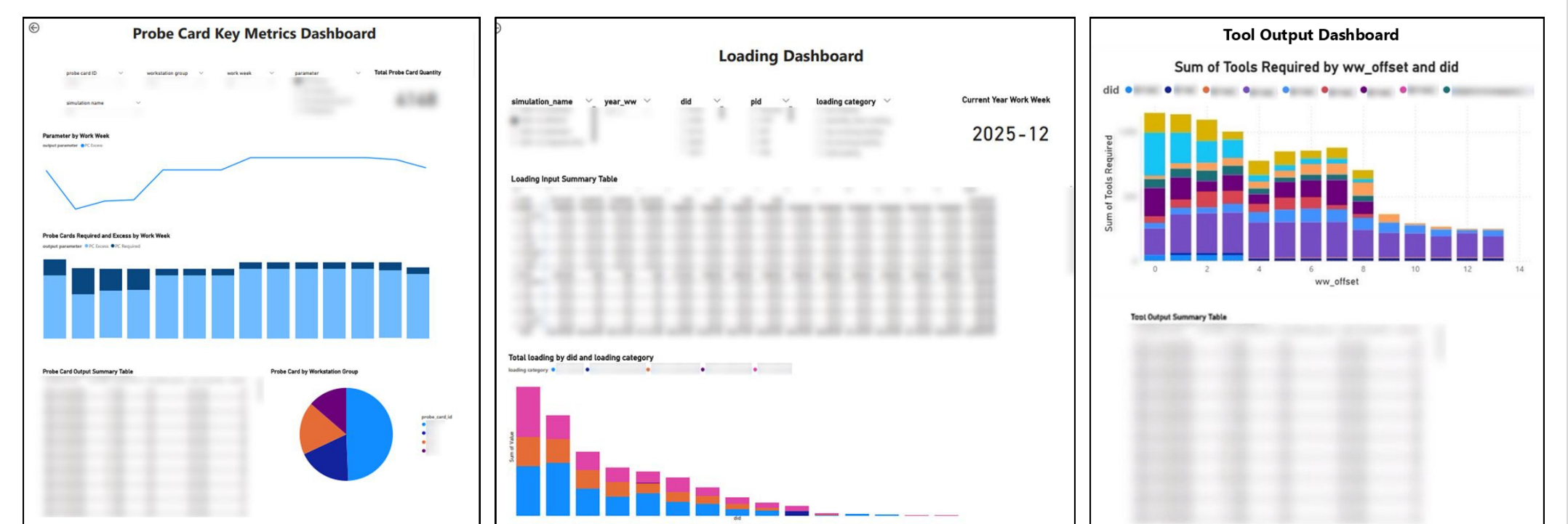
Run Base Model	Run Change Model	Reload Input Validation Parameters
----------------	------------------	------------------------------------

Homepage Illustration

did_pid_workstation_name_temperature	parameter_name	ww_offset	value
D12D,SDP,WS1,HOT		1	7
D12D,SDP,WS2,HOT	Factor 1	2	7
D23D,IE,WS2,HOT	Factor 2	3	7
D23D,IE,WS2,COLD		4	7

Input Validation Illustration

Visualization



Results

Improvement in resource allocation

Method	Wafer Type	Workstation Available	Resources Available	Resources Required	Excess Percentage (%)
Original Manual Allocation	A	Tool C	120	100	20
		Tool C_Stage2			
		Tool C_Stage3			
Project's Resource Allocation Model	A	Tool C	50	50	33
		Tool C_Stage2	40	40	
		Tool C_Stage3	30	0	
Original Manual Allocation	B	Tool C	20	17	3
		Tool C_Stage2			
		Tool C_Stage3			
Project's Resource Allocation Model	B	Tool C	0	0	14
		Tool C_Stage2	0	0	
		Tool C_Stage3	30	15	

Our model results in an **increase** in excess resource percentage of **13%** for wafer A, followed by an **11%** for wafer B when compared to the manual method.

Improvement in execution time

Method	Execution Time (seconds)
Original Manual Allocation	3600
Project's Resource Allocation Model	300

Our model significantly **reduces the time required to generate the base model's output by 91.7%** when compared to the manual method.

Key takeaways

These improvements **enhance efficiency, minimize human error, and enable faster decision-making** in wafer processing.

Further Improvement

Inclusion of more hyperparameters to the model

Increasing hyperparameter options in the model provides more tuning for what-if analysis, leading to better planning accuracy.

Deployment of model to server

Deployment on the server allows a default model to run weekly and reduces manual processes.

Concurrent running of the model

The current model assumes a single planner, which may be limiting. Concurrent running of the model can improve planning efficiency.

Database optimization

As data grows linearly with the number of models, query bottlenecks may arise. Indexes and partitions could be configured for optimization.