INF

FAKULTÄT FÜR
INFORMATIK

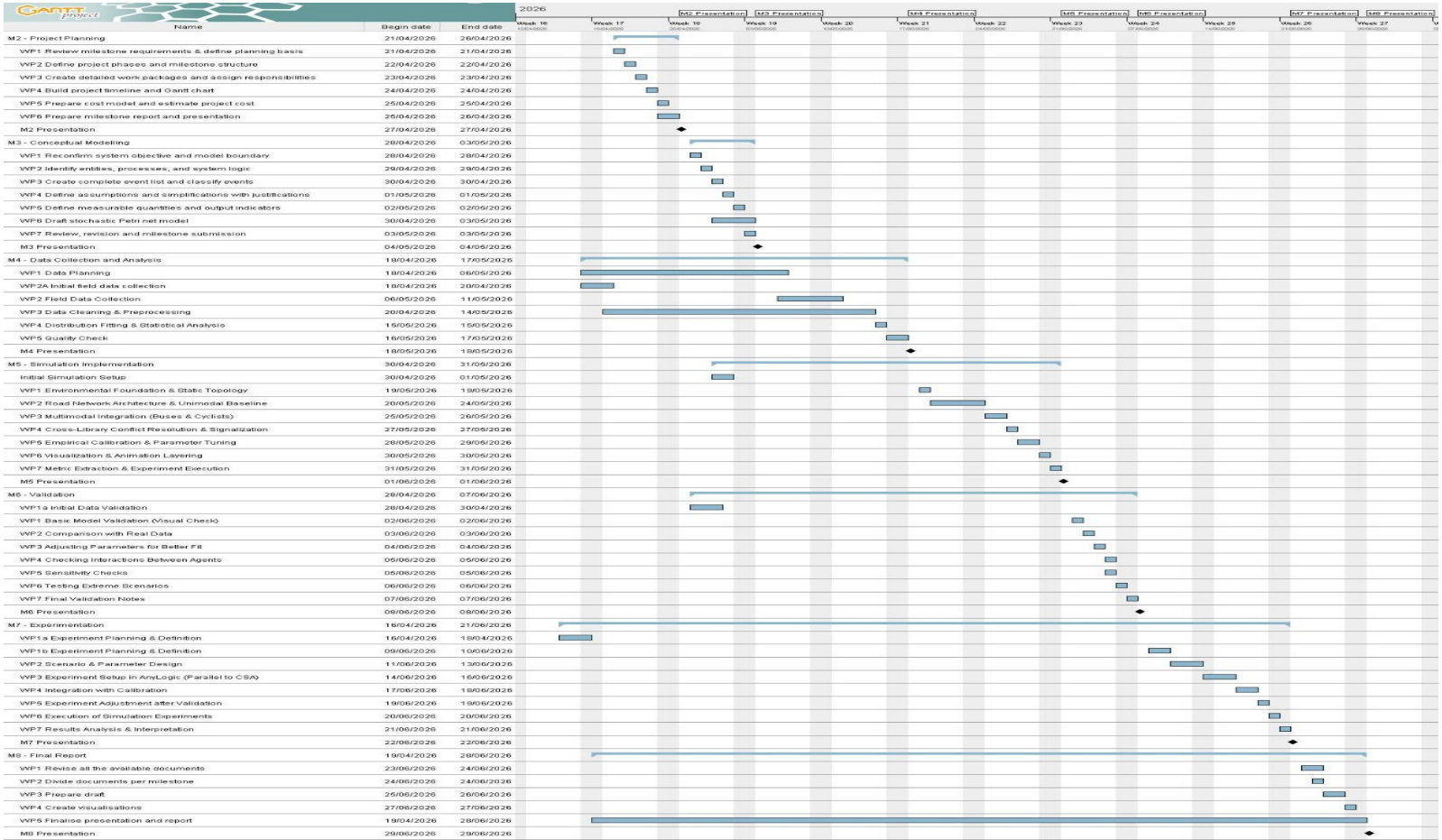
Milestone 3: Conceptual Modelling

Team D

Ved Yogesh Masekar
Satyajeet Sangram Jambure
Rohan Kumar Singh
Mohammed Ahmad Ayman Obidou
Visman Jeet Singh Walia
Sanidhya Vinayak Londhe

Revision of Project Plan

MS	Dates	Responsible	Support
Project Planning	21.04–27.04	Ved	
WP 1- Review milestone requirements and define planning basis	21.04 | 6		Satyajeet, Sanidhya
WP 2 - Define project phases and milestone structure	22.04 | 8		Rohan, Visman
WP 3 - Create detailed work packages and assign responsibilities	23.04 | 10		Visman
WP 4 - Build project timeline and Gantt chart	24.04 | 8		Mohammed, Sanidhya
WP 5 - Prepare cost model and estimate project cost	25.04 | 8		Rohan, Satyajeet
WP 6 - Prepare milestone report and presentation	25.04-26.04 | 10		Satyajeet
Conceptual Modelling	28.04–04.05	Satyajeet	
WP 1 - Reconfirm system objective and model boundary	28.04 | 8		Ved, Visman
WP 2 - Identify entities, processes, and system logic	29.04 | 10		Mohammed
WP 3 - Create complete event list and classify events	30.4 |12		Rohan
WP 4 - Define assumptions and simplifications with justifications	1.05 | 8		Sanidhya
WP 5 - Define measurable quantities and output indicators	2.05 | 10		Sanidhya
WP 6 - Draft stochastic Petri net model	30.04 - 3.05 | 12		Ved, Mohammed
WP 7 - Review, revision and milestone submission	3.05 | 10		All
Data collection and analysis	05.05–18.05	Rohan	
WP 1 - Data Planning	5.05-6.05 | 14		Mohammed, Visman
WP 2 - Field Data Collection	18.04|6.05-11.05 | 36		All
WP 3 - Data Cleaning & Preprocessing	12.05-14.05 | 16		Sanidhya
WP 4 - Distribution Fitting & Statistical Analysis	15.05 | 10		Satyajeet
WP 5 - Quality Check	16.05-18.05 | 14		Ved
Simulation implementation	19.05–1.06	Mohammed	
WP 1 - Environmental Foundation & Static Topology	19.05 | 10		Ved
WP 2 - Road Network Architecture & Unimodal Baseline	20.05-24.05 | 8		Satyajeet
WP 3 - Multimodal Integration (Buses & Cyclists)	25.06-26.05 | 12		Rohan, Visman
WP 4 - Cross-Library Conflict Resolution & Signalization	27.05 | 12		Sanidhya
WP 5 - Empirical Calibration & Parameter Tuning	28.05-29.05 | 10		Rohan
WP 6 - Visualization & Animation Layering	30.05 | 8		Visman
WP 7 - Metric Extraction & Experiment Execution	31.05 | 10		Satyajeet, Sanidhya
Validation	02.06–08.06	Sanidhya	
WP 1 - Basic Model Validation (Visual Check)	2.06 | 10		Ved, Mohammed
WP 2 - Comparison with Real Data	3.06 | 8		Rohan
WP 3 - Adjusting Parameters for Better Fit	4.06 | 12		Satyajeet, Sanidhya
WP 4 - Checking Interactions Between Agents	5.06 | 10		Visman
WP 5 - Sensitivity Checks	5.06 | 8		Rohan, Visman
WP 6 - Testing Extreme Scenarios	6.06 | 12		Ved, Satyajeet
WP 7 - Final Validation Notes	7.06 | 10		Mohammed
Experimentation	09.06–22.06	Visman	
WP 1 - Experiment Planning & Definition	16.04|9.06-10.06 | 15		Ved, Mohammed
WP 2 - Scenario & Parameter Design	11.03-13.06 | 10		Rohan, Satyajeet
WP 3 - Experiment Setup in AnyLogic (Parallel to CSA)	14.06-16.06 | 10		Sanidhya
WP 4 - Integration with Calibration	17.06-18.06 | 15		Satyajeet
WP 5 - Experiment Adjustment after Validation	19.06 | 10		Ved, Satyajeet
WP 6 - Execution of Simulation Experiments	20.06 | 15		Rohan, Sanidhya
WP 7 - Results Analysis & Interpretation	21.06 | 15		Ved, Satyajeet, Mohammed
Final report	23.06–29.06	Ved	All
WP 1 - Revise all the available documents	23.06-24.06 | 20		All
WP 2 - Divide documents per milestone	24.06 | 15		All
WP 3 - Prepare draft	25.06-26.06 | 20		All
WP 4 - Create visualisations	27.06 | 10		All
WP 5 - Finalise presentation and report	27.06-28.06 | 25		All



Name	Begin date	End date
M2 - Project Planning	21/04/2026	26/04/2026
WP1 Review milestone requirements & define planning basis	21/04/2026	21/04/2026
WP2 Define project phases and milestone structure	22/04/2026	22/04/2026
WP3 Create detailed work packages and assign responsibilities	23/04/2026	23/04/2026
WP4 Build project timeline and Gantt chart	24/04/2026	24/04/2026
WP5 Prepare cost model and estimate project cost	25/04/2026	25/04/2026
WP6 Prepare milestone report and presentation	26/04/2026	26/04/2026
M2 Presentation	27/04/2026	27/04/2026
M3 - Conceptual Modelling	28/04/2026	03/05/2026
WP1 Reconfirm system objective and model boundary	28/04/2026	28/04/2026
WP2 Identify entities, processes, and system logic	29/04/2026	29/04/2026
WP3 Create complete event list and classify events	30/04/2026	30/04/2026
WP4 Define assumptions and simplifications with justifications	01/05/2026	01/05/2026
WP5 Define measurable quantities and output indicators	02/05/2026	02/05/2026
WP6 Draft stochastic Petri net model	30/04/2026	03/05/2026
WP7 Review, revision, and milestone submission	03/05/2026	03/05/2026
M3 Presentation	04/05/2026	04/05/2026
M4 - Data Collection and Analysis	18/04/2026	17/05/2026
WP1 Data Planning	18/04/2026	06/05/2026
WP2A Initial field data collection	18/04/2026	20/04/2026
WP2 Field Data Collection	06/05/2026	11/05/2026
WP3 Data Cleaning & Preprocessing	20/04/2026	14/05/2026
WP4 Distribution Fitting & Statistical Analysis	15/05/2026	15/05/2026
WP5 Quality Check	16/05/2026	17/05/2026
M4 Presentation	18/05/2026	18/05/2026
M5 - Simulation Implementation	30/04/2026	31/05/2026
Initial Simulation Setup	30/04/2026	01/05/2026
WP1 Environmental Foundation & Static Topology	19/05/2026	19/05/2026
WP2 Road Network Architecture & Unimodal Baseline	20/05/2026	24/05/2026
WP3 Multimodal Integration (Buses & Cyclists)	25/05/2026	26/05/2026
WP4 Cross-Library Conflict Resolution & Signalization	27/05/2026	27/05/2026
WP5 Empirical Calibration & Parameter Tuning	28/05/2026	29/05/2026
WP6 Visualization & Animation Layering	30/05/2026	30/05/2026
WP7 Metric Extraction & Experiment Execution	31/05/2026	31/05/2026
M5 Presentation	01/06/2026	01/06/2026
M6 - Validation	28/04/2026	07/06/2026
WP1a Initial Data Validation	28/04/2026	30/04/2026
WP1 Basic Model Validation (Visual Check)	02/06/2026	02/06/2026
WP2 Comparison with Real Data	03/06/2026	03/06/2026
WP3 Adjusting Parameters for Better Fit	04/06/2026	04/06/2026
WP4 Checking Interactions Between Agents	05/06/2026	05/06/2026
WP5 Sensitivity Checks	05/06/2026	05/06/2026
WP6 Testing Extreme Scenarios	06/06/2026	06/06/2026
WP7 Final Validation Notes	07/06/2026	07/06/2026
M6 Presentation	08/06/2026	08/06/2026
M7 - Experimentation	16/04/2026	21/06/2026
WP1a Experiment Planning & Definition	16/04/2026	18/04/2026
WP1b Experiment Planning & Definition	09/06/2026	10/06/2026
WP2 Scenario & Parameter Design	11/06/2026	13/06/2026
WP3 Experiment Setup in AnyLogic (Parallel to CSA)	14/06/2026	16/06/2026
WP4 Integration with Calibration	17/06/2026	18/06/2026
WP5 Experiment Adjustment after Validation	19/06/2026	19/06/2026
WP6 Execution of Simulation Experiments	20/06/2026	20/06/2026
WP7 Results Analysis & Interpretation	21/06/2026	21/06/2026
M7 Presentation	22/06/2026	22/06/2026
M8 - Final Report	19/04/2026	28/06/2026
WP1 Revise all the available documents	23/06/2026	24/06/2026
WP2 Divide documents per milestone	24/06/2026	24/06/2026
WP3 Prepare draft	25/06/2026	26/06/2026
WP4 Create visualisations	27/06/2026	27/06/2026
WP5 Finalise presentation and report	19/04/2026	28/06/2026
M8 Presentation	29/06/2026	29/06/2026

Revision of Project Plan

Cost Type	Amount (€)
Weekly meetings	9,900
Planned execution cost	45,100
Total cost	55,000
Total available budget	60,000
Remaining reserve	5,000

Milestone	Team Hours	Cost (€)	Actual
M1 – Team	20	2,000	1500
M2 – Project Plan	50	5,000	4500
M3 – Conceptual Model	70	7,000	6000
M4 – Data Analysis	90	9,000	
M5 – Simulation Program	80	8,000	
M6 – Validation	70	7,000	
M7 – Experiments	90	9,000	
M8 – Final Report	80	8,000	
Total	550	55,000	12000

Objectives of this milestone

- Abstract the real corridor into a simulation-ready model
- Develop a stochastic Petri net of the system
- Identify and classify all relevant events
- Define assumptions, inputs, and simplifications
- Specify measurable outputs and simulation results
- Provide the basis for later experiments and simulation implementation

Assumptions and Simplifications

- Single lane per direction for cars and bicycles
- West entries join north→south, east entries join south→north
- U-turns only at signals
- Queues and delays are caused by signals, merges, exits, and conflicts
- Inputs include signals, segments, entries/exits, and demand
- Corridor simplified into a flow model with queues and delays

Event list

Primary Events

- Vehicle arrivals at corridor boundaries
- Bicycle arrivals at corridor boundaries
- Pedestrian arrivals at corridor boundaries
- Vehicle entries from side accesses
- Bicycle entries from side accesses
- Pedestrian entries from side accesses

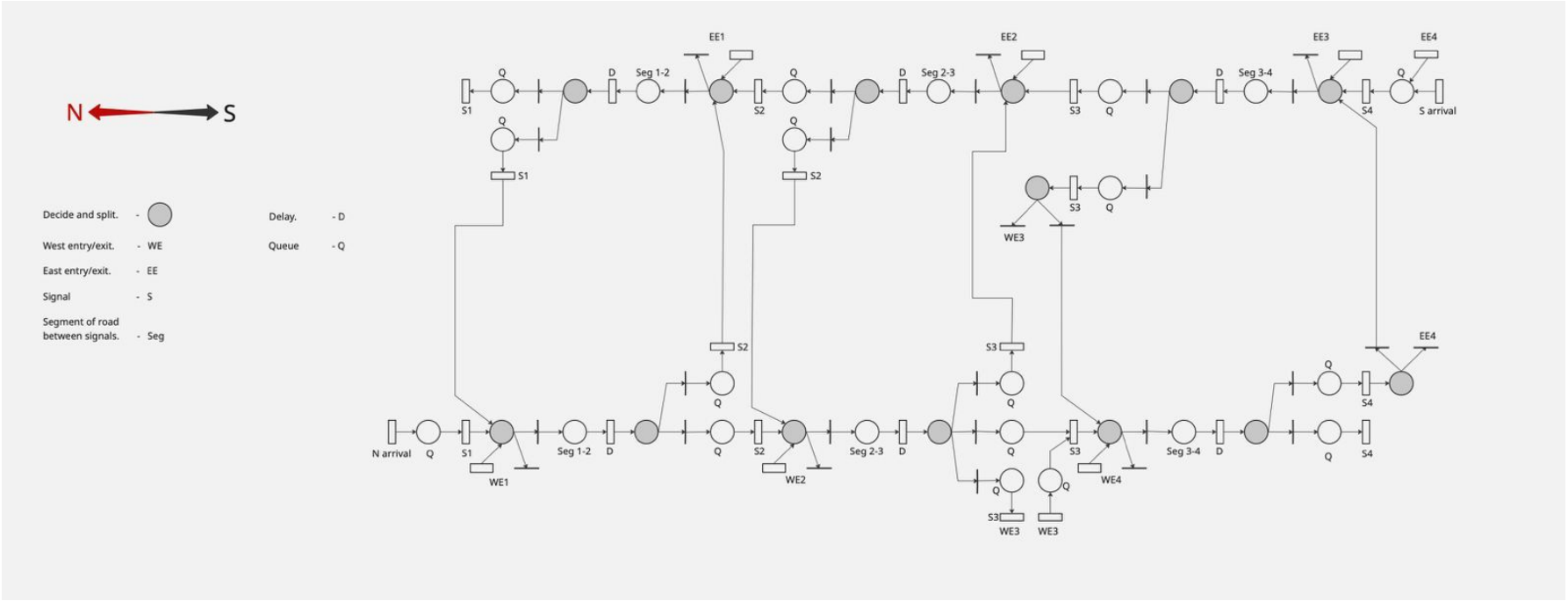
Event list

Secondary Events

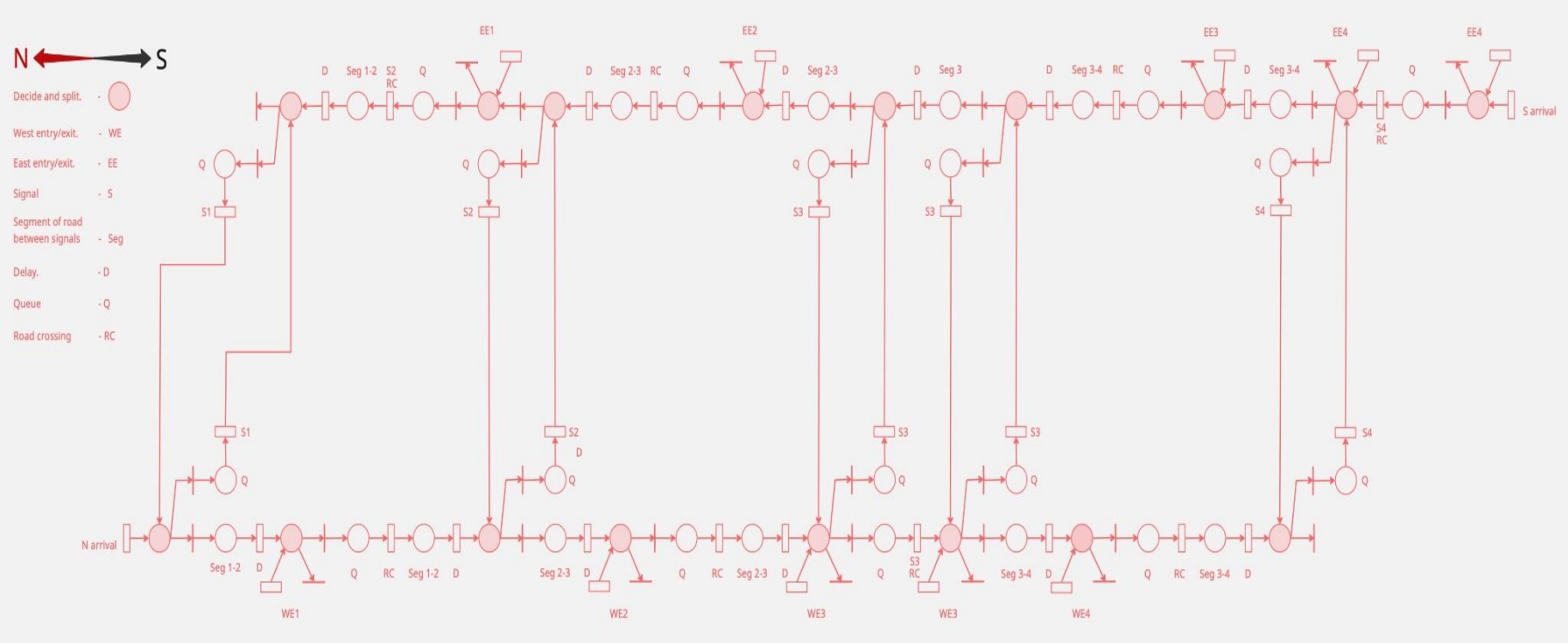
- Queue formation and spillback
- Crossing of signalized nodes
- Segment-to-segment movement
- Lane Merge and diverge movements
- U-turns at signals
- Signal phase changes
- Pedestrian crossing events

Street photos

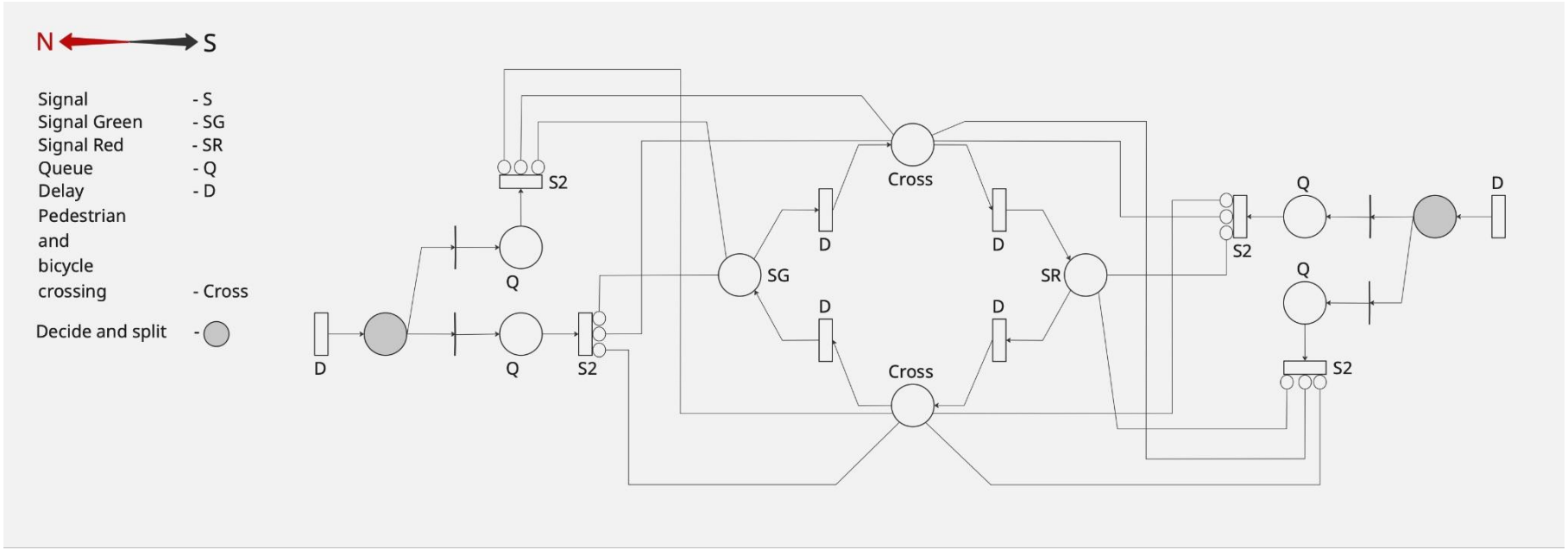
Petri net - Car lanes



Petri net - Bicycle & Pedestrian lanes



Petri net - Signal logic



Distributions

Stochastic

- Car arrival at corridor boundaries
- Bicycle arrival at corridor boundaries
- Arrival from west or east entry points
- Non-uniform queue release and merging movement

Distributions

Empirical

- Observed traffic counts
- Observed queue lengths and delays
- Observed side-access activity
- Observed signal positions and crossing behavior

Distributions

Timeless

- Decision to go straight, left, or right
- Signal permission to cross
- U-turn permission at signals
- Change of movement state in the Petri net
- Merge/exit segment permission

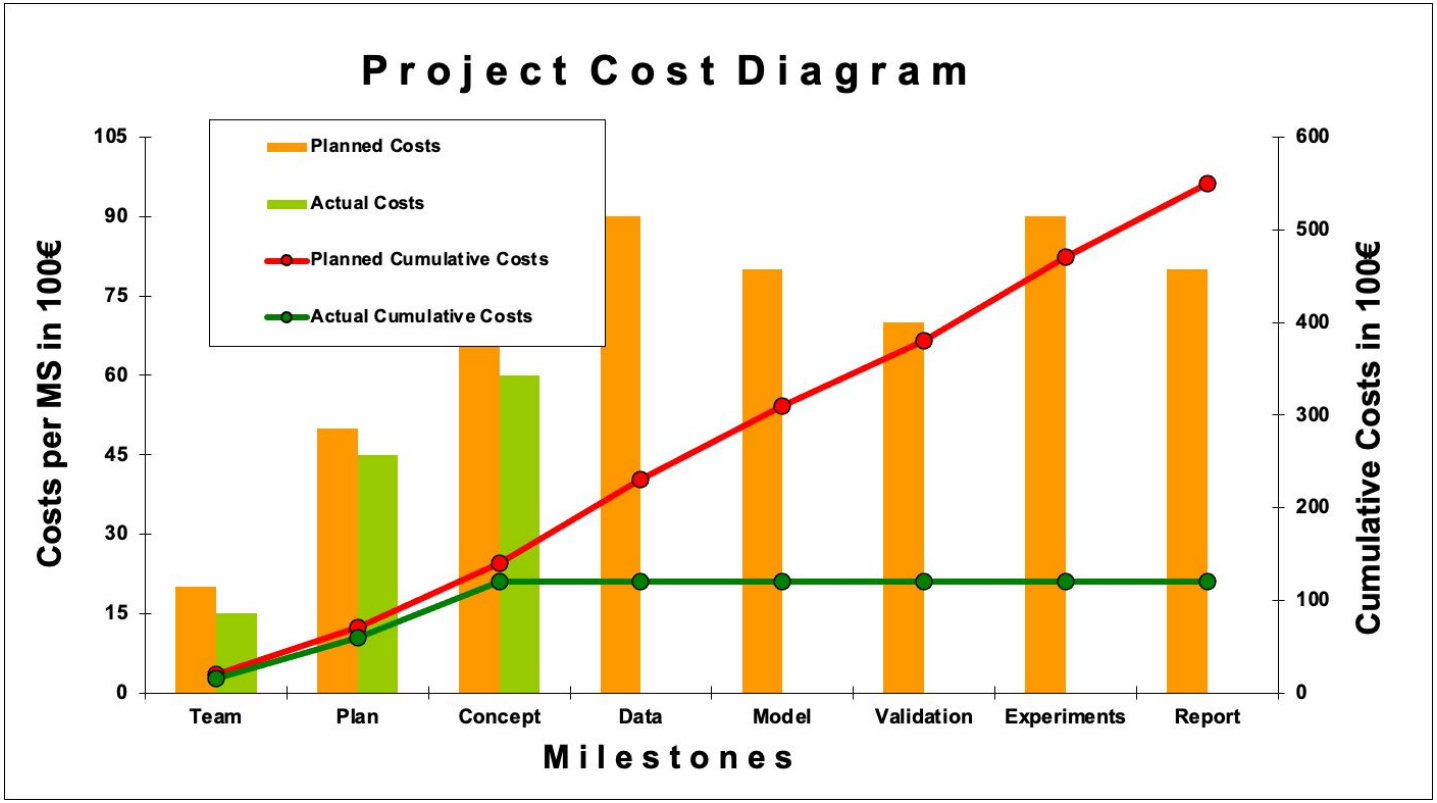
Quantities to be measured

- Queue lengths before signals S1, S2, S3, and S4.
- Delays in each segment and at signalized crossings.
- Travel time from north to south and south to north.
- Throughput through the corridor and through side accesses.
- Stops caused by red signals or pedestrian crossing phases.
- Side-access movements entering and exiting the main corridor.
- Non-motorized waiting and crossing time.
- Potential conflict points due to merging, diverging, and turning movements.

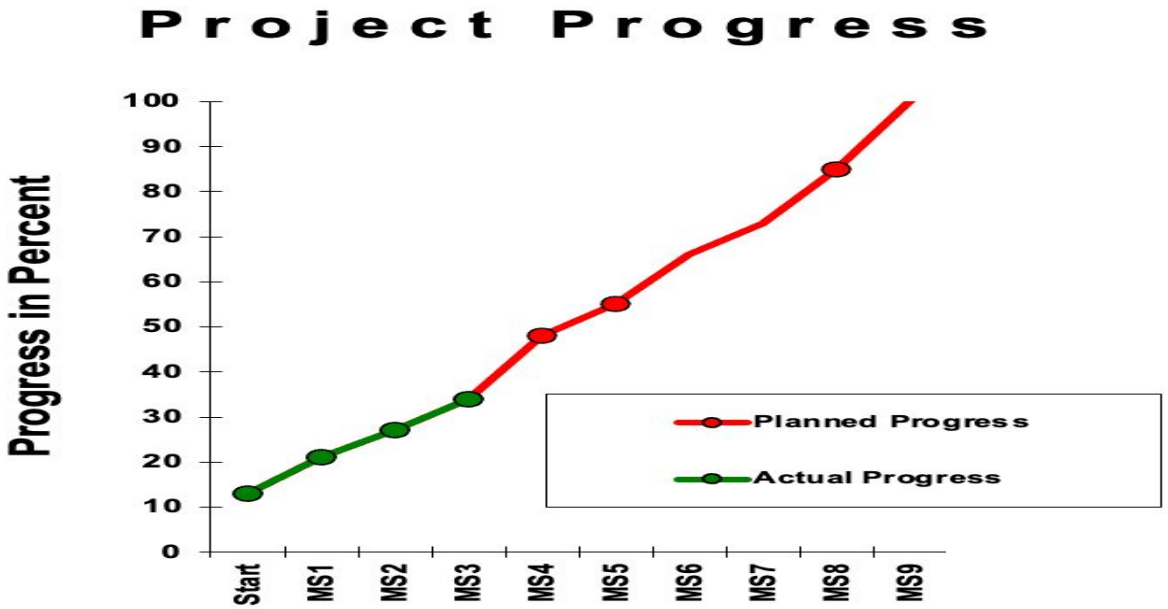
Experiments to be performed

- Car and bike lanes segregation.
- Emergency vehicle response time.
- Time of day operation.
- Future traffic growth scenario.

Project cost till date



Project progress



Lessons learned

- Simplifying the real corridor is necessary for modeling.
- Clear assumptions are important for a valid conceptual model.
- Petri nets help represent flow, queues, and control logic.
- Signal logic is complex and may need separate treatment.
- Early definition of outputs improves later simulation work.

Thank you!