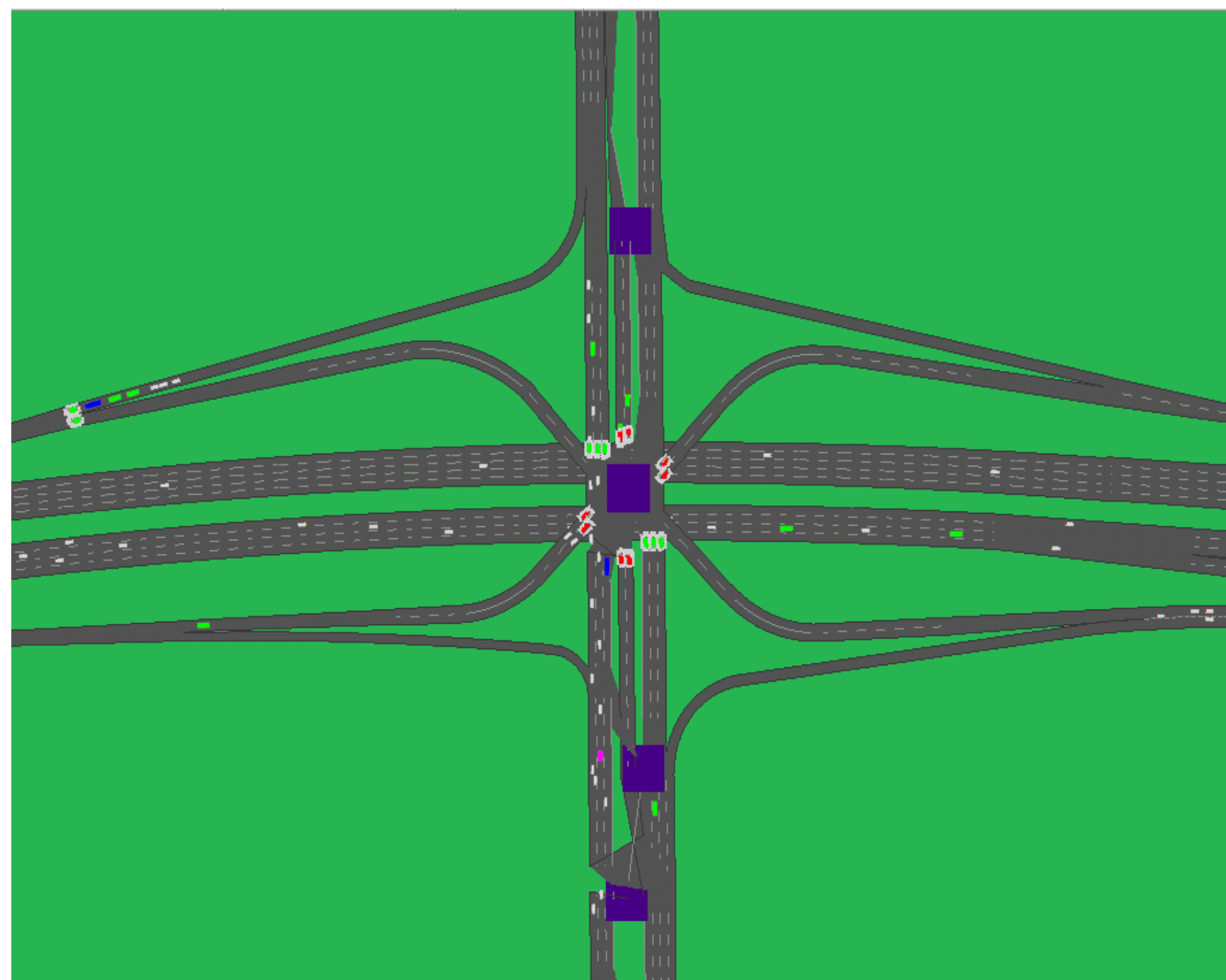


## A NEW APPROACH TO TRAFFIC MANAGEMENT

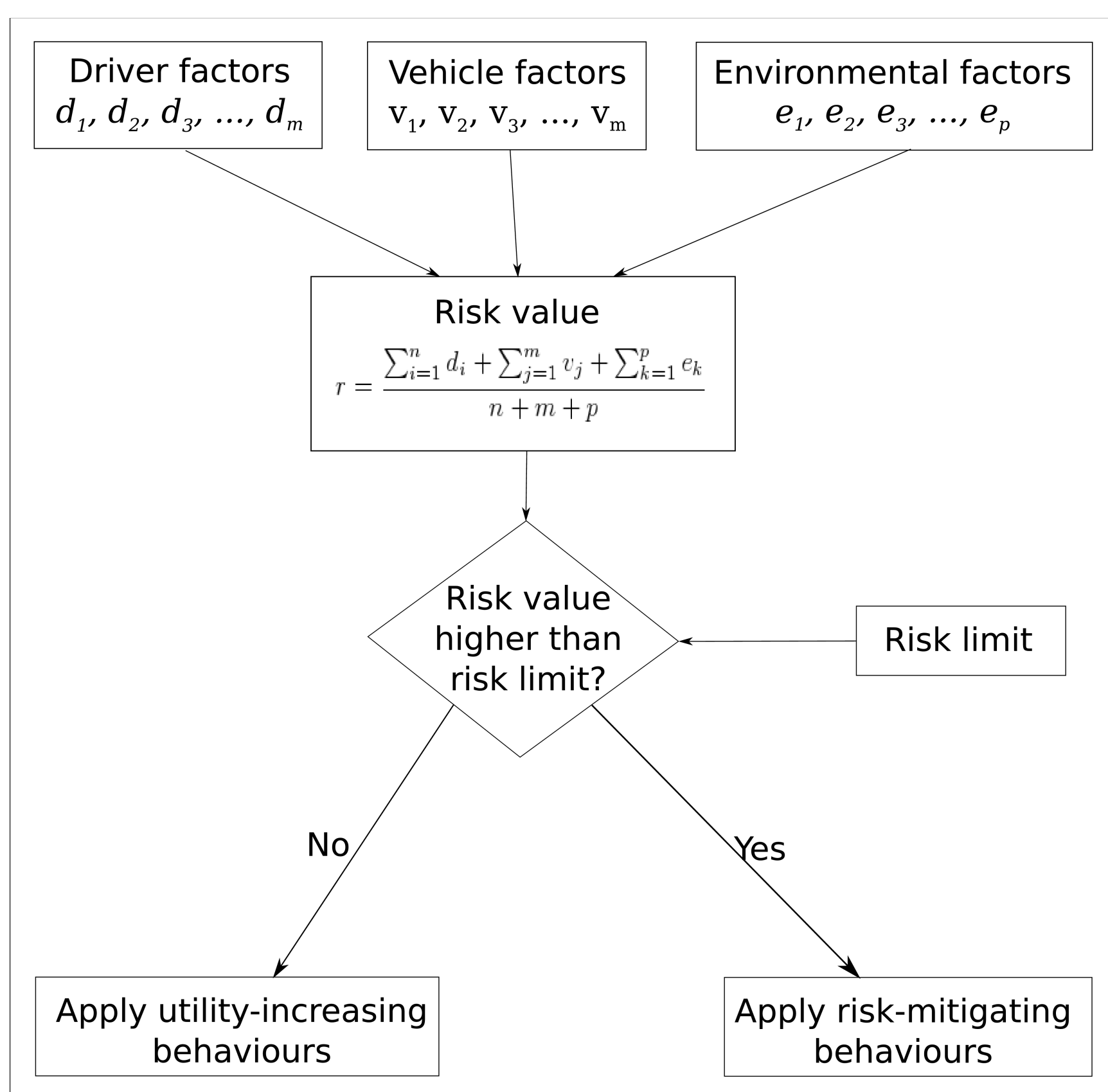
Using emerging technologies to develop a more fine-grained and dynamic way to balance accident risk with road system utility

- Advances in technology – particularly vehicular ad-hoc networks – make possible a more dynamic approach to traffic management
- We can take advantage of the differences between individual vehicles and drivers
  - Improve utility (throughput and speed) while maintaining an acceptably low risk of accidents
- Risk factors are constantly changing
- However, it is now possible to have computational power in vehicles and communications between vehicles
- This means we can calculate risk and modify vehicle behaviour in real-time



## RISK LIMITS

- Set a limit on risk; vehicles may not exceed this level of risk
- Calculate current risk, taking into account risk factors relating to:
  - the driver
  - the vehicle
  - the current environment (surrounding vehicles, the weather, road type, etc.)
- Vehicles that are above the risk limit modify their behaviour to reduce their risk level
- Vehicles that are below the risk limit modify their behaviour to increase throughput and speed



## TESTING THE MODEL

- Simulation were run using the Paramics traffic simulator
- First a control simulation measured the risk levels for different vehicle types (passenger cars, trucks, etc.)
- Then experimental simulations were run
  - Vehicles tried to optimise road system utility while keeping to the risk limit
- Vehicles calculated their current risk and decided on appropriate behaviour at each time step
- Vehicles could affect their risk level and utility by adjusting their speed, headway (distance between vehicles) or by changing lanes

## RESULTS

- For risk limits between 1.1 and 1.4, arrival rate, average speed and accident rate are all improved compared to the control
- Above 1.4, utility (arrival rate and average speed) can be improved at the expense of an increased accident rate,
- Below 1.1, accident rate can be decreased but at the expense of decreased utility

