INTEGRATED IMPACT ASSESSMENT OF SHARED, AUTOMATED AND ELECTRIC MOBILITY

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1. INTRODUCTION

- To face economic, environmental, and societal impacts of mobility the transport sector goes through some major transformations: **automation**, **electrification** and **shared mobility**.
- Despite the large potential of shared automated and electric vehicles (SAEVs) to improve mobility systems, societal factors, there are remaining concerns about **environmental and energy effects.**

Vehicle Electrification
- Key step to face EU targets to reduce road transport emissions
- Strongly dependent of carbon intensity of electricity mix

Vehicle Automation
- Can boost energy efficiency due to vehicle performance and improve safety
- May induce travel demand, promote vehicle utilization, and increase vehicle footprint

Shared Mobility
- Reduce GHG emissions and energy use,
- Save travel time and money.
- Mainly viable at urban areas

2. RESEARCH CHALLENGES & OBJECTIVES

2.1 RESEARCH CHALLENGES

- Understand the expected **changes in mobility patterns** and behaviors;
- Perceive the implications of the **transition process** where automation will coexist with non-automated vehicles;
- Understand the **power requirements** and energy consumption of **high levels of vehicle automation.**

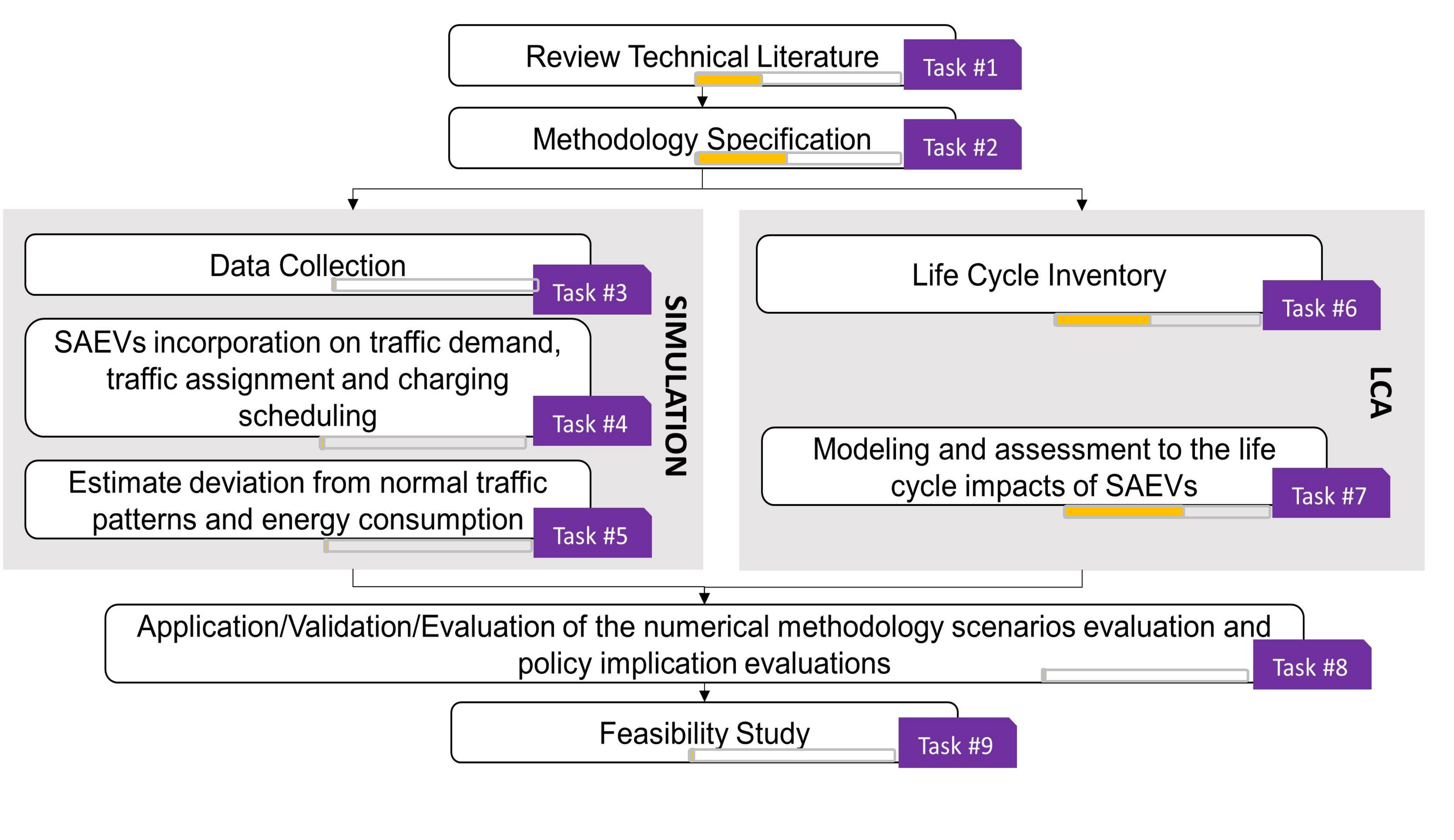
2.2 OBJECTIVE

To address environmental and energy related challenges of future mobility with shared, fully automated and electric vehicles (SAEVs).

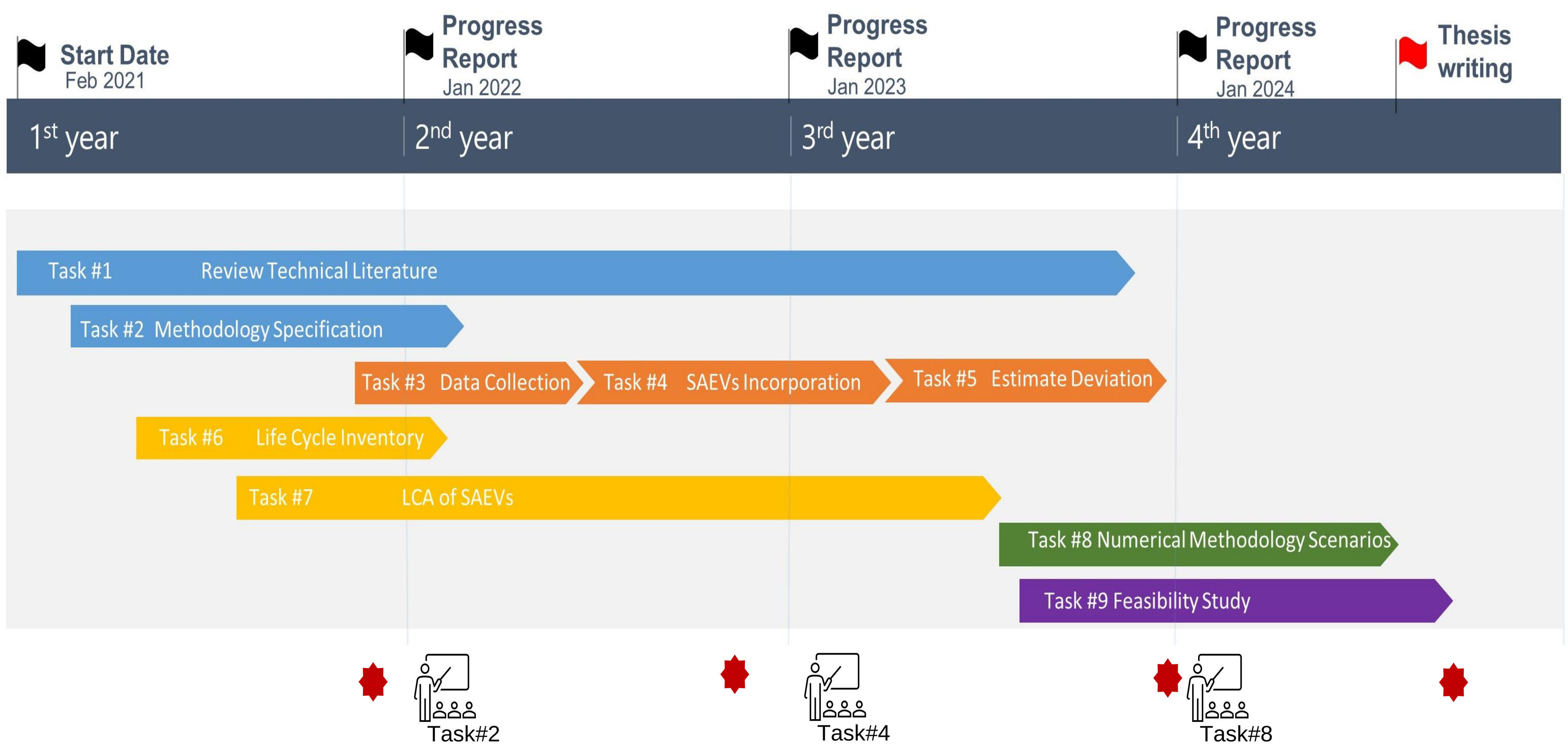
1. What are the impacts of SAEVs system through a life cycle concept?
2. Which routing strategies should be adopted for energy-efficient driving decisions?
3. What are the technical, energetic, and environmental viability of SAEVs?

3. METHODOLOGY

3.1 METHODOLOGY OVERVIEW



3.2 RESEARCH PLAN SCHEDULE



Milestones
Work Dissemination

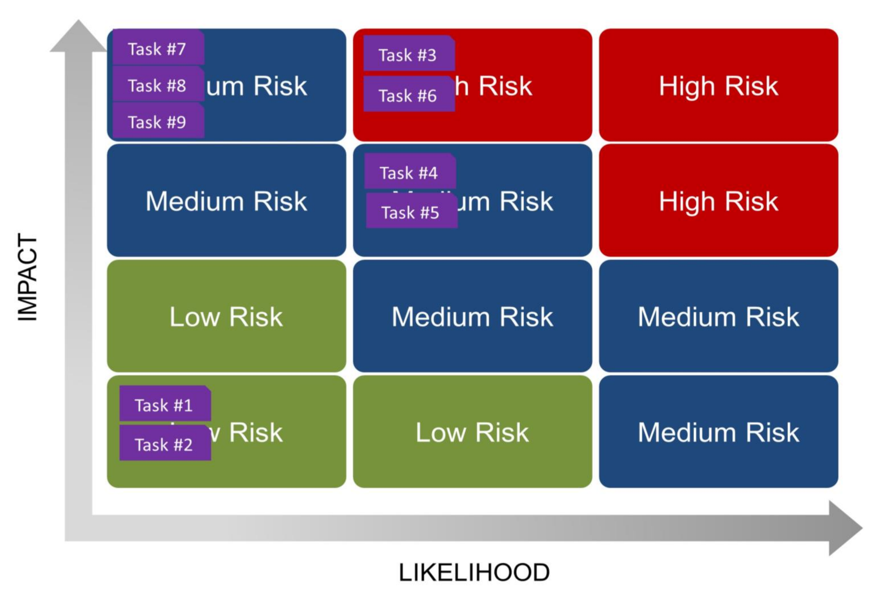
Training Period at TU Delft

1st year Milestones

Vilaça, M., Santos, G., Oliveira, Mónica S.A., Correia, G., Coelho, M., *A Life Cycle Assessment of Shared, Autonomous and Electric Vehicle Fleet in Regional Scale*, presented at 100th Transportation Reserach Board Meeting (TRB2021), Jan., 2021

Vilaça, M., Santos, G., Oliveira, Mónica S.A., Correia, G., Coelho, M., *A Life Cycle Assessment of Shared, Autonomous and Electric Vehicle (SAEV) system used for intercity trips*, submitted at Applied Energy.

3.3 RISK MATRIX AND CONTINGENCY PLAN



LOW RISK

Low risk is considered acceptable since both likelihood and overall consequence for the success of the research plan are not compromised.

MEDIUM RISK

The tasks at medium risk level are mostly related to their impact than likelihood. To face this level of risk the pH.D. candidate considers the development of models based on state-of-the-art reference values in the case real data is not available.

HIGH RISK

Tasks at the high-risk level were guaranteed at the research plan. The tasks under this level are particularly related to data acquisition which can be filled since the ph.D. candidate will have the opportunity to access data from ongoing projects coordinated by the advisors.

4. INTELLECTUAL MERIT AND BROADER IMPACT

4.1 INTELLECTUAL MERIT

- The research outputs must give an **integrated perspective** of the **environmental impacts of SAEVs** and their feasibility in a sustainable perspective.
- Focusing on environmental and energetic perspective of outbreaking mobility systems the **feasibility study** will include social and economic key aspects.

4.2 BROADER IMPACT

- **Departments of Energy and Transportation**, as well as **private companies** operating in intelligent transportation systems will benefit from the research outcomes,
- Findings of this research may provide **local and transport authorities** recommendations.
- The potential widespread adoption of the research findings may benefit **society** by 1) Promoting equal and easier access to mobility; 2) Encouraging sharing and reducing private vehicles and 3) Reducing emissions and promoting a clean and sustainable transport system

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