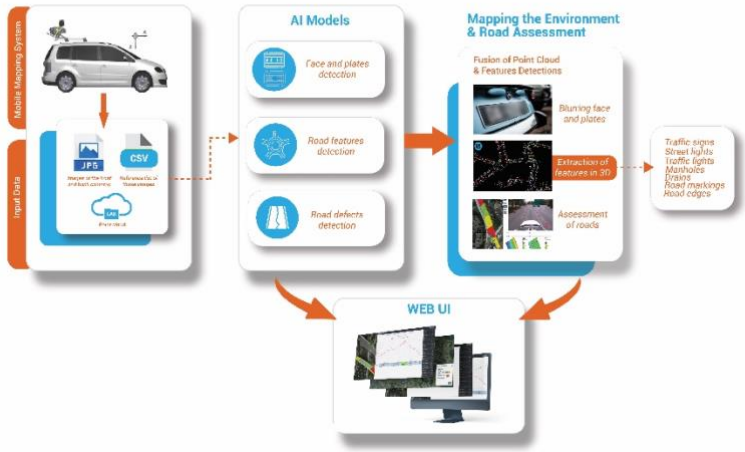
1. Technical Specification Double-side Page

2. **TECHNICAL SCOPE:** Summarize the mock-up devised during the EXPLORE phase: how have you addressed the challenge/Theme Challenges and tackled with its requirements and data. Include a diagram.

RDextractor is AI-powered software which allows faster and more objective/reliable road condition data for informed and optimized road maintenance bringing potentially enormous economic and environmental benefits. Proper, timely, and selective road maintenance extends the lifespan of the pavement, reduces the cost of road maintenance, lessens vehicle damage and accidents, and minimizes sustained traffic disturbance. An automated, accurate and robust distress detection system is essential to quantify the quality of road surfaces and assist in optimizing the maintenance of the road network. The automatic detection system will be able to prevent pavement degradations, such as transverse and longitudinal cracks, potholes, rutting, road fretting, road deformation, and standing water, for minimized maintenance and timely and informed renovations. Communication with clients and data access will be realized using our web application.

From the perspective of data providers, RDextractor has no restrictions due to hardware used for road data collection like other available solutions, which means that RDextractor is compatible with all available hardware.

On the other side, RDextractor will enable reliable extraction of data road conditions to the data users like authorities, cadastres, operative road agencies, the automotive industry and travel agencies. Moreover, RDextractor will provide an automatic extraction inventory of road infrastructure and trees, which will significantly distinguish us from our competitors and fill the existing gap in the market. Generally speaking, our solution will provide more reliable intelligence than any other available software and enable stakeholders interested in infrastructure maintenance to overbridge the current shortage of information to fully address their challenges.



3. **ALGORITHMS, TOOLS AND CONCLUSIONS:** Detail the algorithms and tools identified to accomplish the challenge/Theme Challenges. Show clear understanding of the used REACH dataset/s and addressed challenge/Theme Challenges.

The proposed solution will leverage a powerful technology stack consisting of Python, JavaScript, Flask, Postgres, Postgis, Redis, Leaflet, and OpenLayers. Additionally, Pytorch will be used to develop AI models with algorithms such as CNN, Faster RCNN, and YOLO. The system will use Data Provider's datasets, including images from front and back cameras in JPEG format and a complete point cloud in LAS format. The modules will map road defects as points, line, or polygon geometries, derived directly from orthomosaics and panoramic images. The system will assign attributes such as defect type, surface material, center-of-gravity, area, length, corresponding image of the defect, and degree of damage to each object. A spatial dataset comprising defect values with a matching data type will be created to perform attribute analysis quickly and accurately. The final product will be spatial vector data available for download, consisting of points, lines, and polygons that contain attributes with further information and geometry.

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4. **SCALABILITY AND FLEXIBILITY OF THE SOLUTION:** Discuss whether the solution can truly cope with humongous and increasing datasets and how flexible it is to adapt to other related domains and integrate into Data Value Chains (DVC).

The proposed solution is designed to ensure reliable AI data analysis models that improve efficiency in transport infrastructure maintenance, and set secure and trusted data value chains among the relevant stakeholders (authorities, cadastres, operative road agencies, automotive industry and travel agencies).The system's AI models are scalable and can be trained with large amounts of data to improve their accuracy and efficiency. The system's modular design allows it to be easily adapted to other related domains, such as railway infrastructure maintenance or building maintenance. Additionally, the system can integrate into Data Value Chains by providing spatial vector data that can be easily consumed by other systems and applications.

5. **DATA GOVERNANCE AND LEGAL COMPLIANCE:** Describe the security level of the proposed solution, i.e. how authentication, authorization policies, encryption or other approaches are used to keep data secure. Explain how will be compliant with the current data legislations concerning security and privacy (e.g. GDPR).

The proposed solution will have a high level of security to keep data secure. Authentication and authorization policies will be used to ensure that only authorized personnel can access the data. Encryption and other approaches will be used to protect the data from unauthorized access and breaches. The solution will be compliant with current data legislation concerning security and privacy, such as GDPR, by implementing appropriate security measures and ensuring that personal data is processed lawfully, fairly, and transparently.

6. **QUALITY ASSURANCE AND RISK MANAGEMENT:** Describe the quality process planed for the final product. Technologically, which are the potential risks in all the phases of the project (design of the solution, development, testing, deployment…) and indicate mitigation plans to still fulfil the challenge/Theme Challenges and data provider requirements.

We foresee the following potential technical risks:

1. Poor dataset structure, data availability and high-quality pictures (Low risk)

Mitigation: Missing data risk is already mitigated by proposing a REACH experiment that builds on an existing collaboration with our Data provider, who has in the past provided and ensured the high quality and availability of data in the suitable format.

2. Existing module adaptation and merging towards a cohesive module set (Medium risk)

Mitigation: The only thing that may be of risk when it comes to combining and adapting the modules is achieving a competitive operational speed in relation to the competitors for certain features. We intend to continuously monitor the risk and iteratively approach the testing and development of combined modules.

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