# Technical Specification Double-side Page

1. **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.

The Digital Product Passport challenge aimed to provide product designers with all the necessary information to revise the product production toward a circular economy approach; as well as to support retailers meeting the raising consumer and stakeholder demands.

The developed solution provides the final user with visibility over the supply chain and product flow traceability. The supply chain map is combined with supplier assessment on sustainability performance while product flow traceability with environmental impact. This combined approach allows product designer to leverage manufacturing data to redefine the product designs toward circular economy and retailers to engage and communicate the journey of the product and its impact with the consumer and stakeholders.

The digital product passport can be accessed through a QR code present on the label of the final product or displayed through widget on the eCommerce website The web dashboards focus on supplier assessment, risks management, Environmental, Social & governance (ESG) impact, inventory and shipment analysis, product Life Cycle Assessment (LCA) and carbon footprint.

During the EXPERIMENT phase we will develop risk assessment capabilities and LCA and carbon footprint calculations. UI/UX will be modified to deliver operational efficiency.
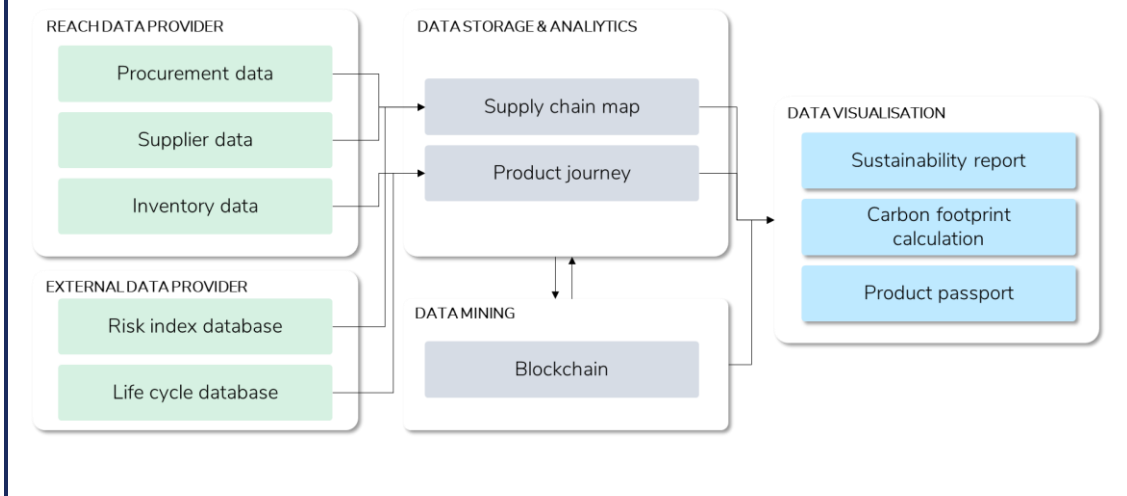
2. **ALGORITHMS, TOOLS AND CONCLUSIONS:** Detail the algorithms and tools identified to accomplish the challenge/Theme Challenges. Show clear understanding of the used REACH dataset/s and addressed challenge/Theme Challenges.

For the solution development, data provided by MIGROS and SONAE MC will be the basis to obtain the digital product passport. Procurement and supplier data combined will provide the map of the supply chain. On this map risk assessment and mitigation will be built by adding relevant data from multiple risk index databases (INFORM – EU Commission, OECD stats and ILO Stats). On the other hand, inventory, and shipment data will give insight on the product journey. Based on this, by leveraging Life Cycle databases (Global LCA Data Access, GHG Protocol, Ecoinvent) the LCA of products and their carbon footprint will be calculated.

Ensuring the integrity of shared information while maintaining confidentiality of all participants is a key value driver. A blockchain agnostic solution and different levels in data visibility represent a guarantee of interoperability between supply chain stakeholders while maintaining privacy and confidentiality. The integration of the FRAMA-C, MAX, Why3 and Data sharing platform will address these challenges.

3. **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

Xylene is deployed on a cloud making the scalability easy: reaching more users with more data. The solution will be built up on different components, all integrated on standard technologies. Different options can be identified under each component to meet specific technical requirements and adapt to future technological needs.

Xylene provides an interoperable solution covering the entire supply chain to answer also future standards requirements. Our modular approach is designed to provide flexibility in integrating multiple data sources.

The tool Multi-Agent eXperimenter (MAX) will support in simulating the solution to evaluate and ensure scalability, stability, performance, fairness, etc., as well as testing the adaptability features of my system, e.g. automatic and dynamic load balancing, elasticity and self-healing networks.

4. **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).

Traceability of products and materials is complex and requires the collaboration of all the involved stakeholders, raising the data sharing problem. Enabling three level of data visibility (Private, Protected and Public) allows the achievement of traceability while maintaining confidentiality. In fact, only due diligence (Protected) and product related data (Public) are anonymised and shared with consumers and stakeholders. Roles and permissions with the respective authentication and authorisation policies will provide different visibility on data to the supply chain stakeholders accordingly to their function.

Additionally, only hashes of documents and transactions are shared the blockchain. This approach makes sure that transactions on the blockchain are immutable and traceable while complying with GDPR rights.

During the EXPERIMENT phase, the integration of FRAMA-C and Why3 will support the development of decentralised capabilities both on Ethereum and Hyper Ledger ensuring respectively data confidentiality and governance.

5. **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.

Procedures and policies to test the solution will be developed together with the solution during the EXPERIMENT phase to deliver high level Quality Assurance (QA). Functional and performance testing will be used for data validation and scalability.

Potential risk in the development of the solution is the completeness of datasets and the quality of this data for the achievement of the digital product passport. Xylene will work in close collaboration with MIGROS and SONAE MC for the definition of the provided dataset. Xylene will also engage with their suppliers to provide on the digital product passport the entire journey of the product from the origin of the materials to the point-of sale.

Risks could arise from the data complexity resulting from the connection of multiple datasets. Xylene relies on its team capabilities and the usage of REACH toolbox for building secure and trusted data value chains.