

**An interdisciplinary laboratory can serve as a bridge between pupils, students, researchers and external partners, enabling participants to explore STEAM fields through their own ideas and transform them into research-based, practical solution**

- The proposed concept "Mad ideas hub" links technical solutions, target audiences and social contribution into one structured development model.
- The lab promotes collaboration and addresses sustainability challenges through school research project incubator and Digital Twin modelling.

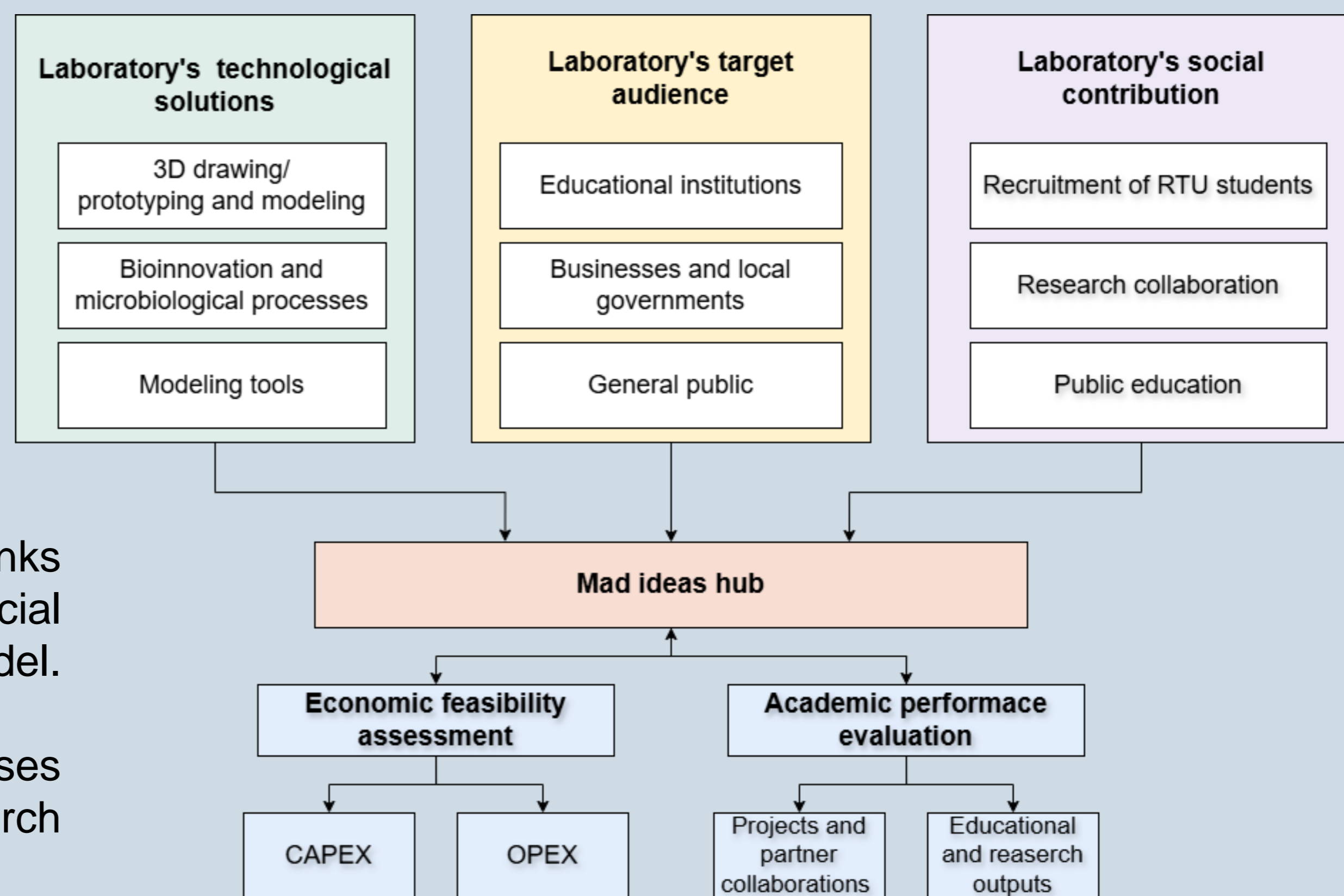


Fig. 1. Conceptual structure of the Mad ideas hub

## Introduction

Engineering and environmental education more and more requires a learning environment where theoretical knowledge relates to the ability to combine knowledge from different fields, make independent decisions and experience how ideas are developed in a research-based settings.

However, students and young people often have limited access to a modern laboratory infrastructure before entering university. The mad ideas hub is a concept, where a long-term engagement between pupils, students and school-university cooperation is developed.

## Laboratory implementation approach

The laboratory's concept is developed through a gradual implementation model that combines technical infrastructure, stakeholder involvement and structures support for developing research-based ideas.

3D prototyping, bioinnovation, virtual reality, and modelling tools support the development of functional prototypes, allowing ideas to be explored, tested and refined in various scenarios.

A student research project incubator is used to connect schools with university mentors and to support the development of research ideas in an academic environment

## Results

The initial laboratory layout has been developed to support practical work, prototyping and collaborative activities.

First pupils have been involved in a student research project development.

An opportunity for cooperation has emerged with a new entrepreneur to support the development of an innovative prototype

Further work includes stakeholder feedback analysis and economic feasibility assessment of the laboratory model

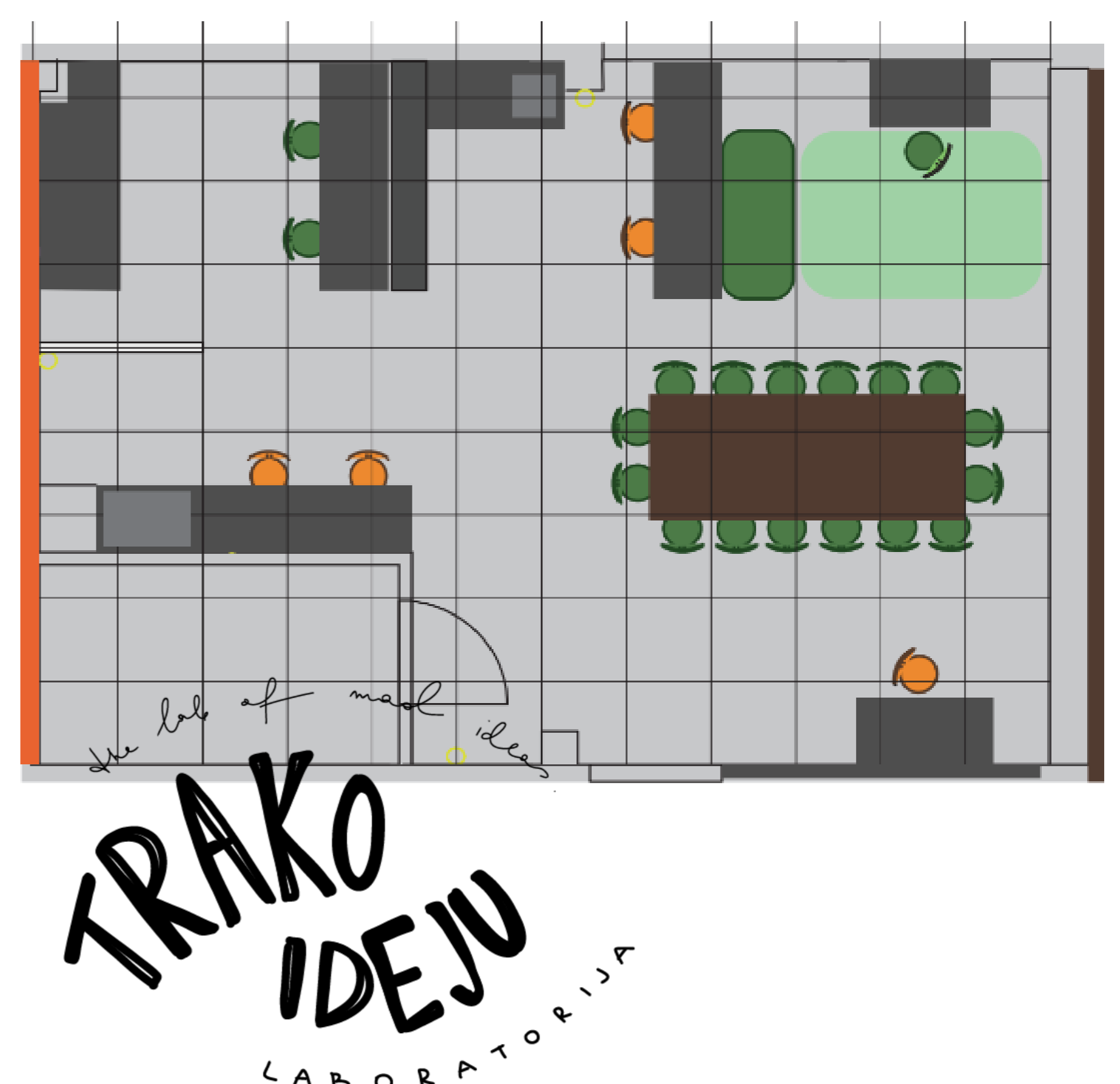


Fig. 2. Proposed layout of the Mad ideas hub