# Enabling Multi-Functional Design through Multi-Material Additive Manufacturing (ENGAGE-in-AM)

Nowadays, most engineering components consist of a single material, with limited functionalities and large overdesign margins, as required by conventional production technologies. Additive manufacturing (AM) is revolutionizing the way we approach product design and manufacturing AM allows **simultaneous printing of different materials with functional properties (multi-material AM)**, enabling component design with "pre-programmed" site-specific properties. In **ENGAGE-in-AM** we will bring this potential to reality **by developing and manufacturing high-performance multi-material products** with a low carbon footprint, for a wide range of applications.

The **ENGAGE-in-AM** program focuses on multi-material AM through powder-bed technology. We will explore combinations of different metallic and/or ceramic materials for powder-based AM and will use computational optimization tools to leverage multifunctional design freedom. We aim to attract partners along the complete value-chain of AM, ranging from material, equipment and software developers to end-users across several sectors, as well as certification bodies.

The program has **four objectives**:

1. **Material-centric**: Design new materials for AM. We will create unique products by maximizing strength versus toughness or by scaling up thermal conductivity while improving corrosion and wear resistance.

2. **Process-centric**: Develop innovative powder-bed multi-material AM equipment and software, able to integrate and operate several powder-bed AM technologies.

3. **Design-centric**: Move from the "try and see" to the "control and predict" approach by applying Artificial Intelligence tools in addition to physics-based multiscale simulations that leverage multifunctional design freedom.

4. **Component-centric**: Manufacture and evaluate multi-material demonstrators with integrated functionalities, for applications in aerospace, oil & gas, maritime, (bio)medical, energy, etc.
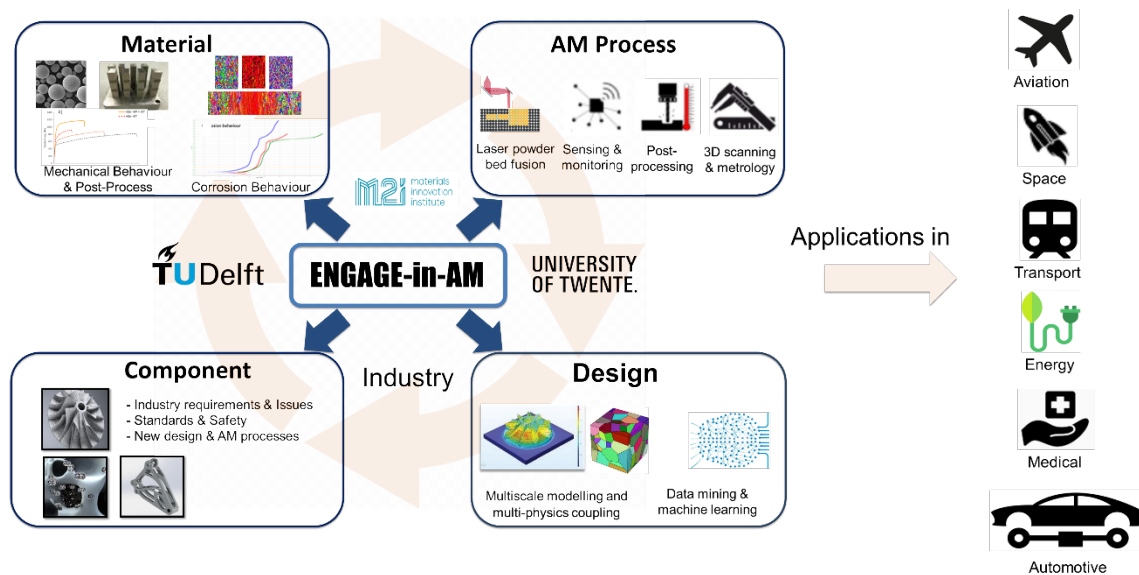
Expected outcome:

- New or improved product functionality, enhanced product quality and weight reduction;

- Multi-material production in one manufacturing step;

- Artificial intelligence tools for an optimum trade-off between weight-saving, functional performance and manufacturability;

- Process-properties database as a step forward towards the standardization of multi-material AM;

- Multi-material products with a low carbon footprint, through optimum usage of raw materials and reduced energy consumption.

- Innovative AM (pre- and post-) process technologies for the production of high quality multi-materials.

Interested? Contact M2i: Viktoria Savran, email to v.savran@m2i.nl, tel. 06 51 68 43 03