Additive Manufacturing is a disruptive technology progressively permeating diverse markets. It is capable to trigger major upheavals reshaping supply chains and business models over the next decade. Many industries are seeking for opportunities how to capitalize on the benefits AM provides; new industries progressively draw their attention to AM’s potential. As well, global research initiatives funded by different governments spark new impulses in the research landscape. Established and newly founded research centers, e.g. in the UK, the US or Germany are continuously striving to close research gaps and to transfer the research results into tangible outcomes for the industry. Therefore, demand-oriented research strategies are needed.

Additive Manufacturing Research Map

To deduce the need for research activity, the AM research landscape was analyzed. As a result, the AM Research Map was created (Figure 1), revealing the research intensity of the analyzed research institutes.

Figure 1: Excerpt from the Research Map, indicating the research intensity in different research fields (rows) for selected institutes/technologies (columns).
For instance, just a few institutes focus on cross-technological research fields, e.g. the development of design rules; the research intensity is medium; others, e.g. material research, are intensively investigated. An outstanding research intensity is prevalent in e.g. mechanical properties, new materials, material quality, microstructure manipulation. Research fields with a rather low research intensity are e.g. supply chain optimization and process automation. Concurrently, conclusions emerge for technology-specific research intensity. The highest and lowest research activity distributed over all research fields are indicated for Powder Bed Fusion Metal and Polymerization Technologies, respectively.

Additive Manufacturing Strategy Map

To identify crucial levers for future research strategies, white spots need to be revealed. Therefore the research activity and intensity were contrasted with the future relevance of the research fields. Process automatization and design rules were determined as white spots and should be considered as levers in future strategies. Research fields such as new materials are important as well. Here however, the research intensity is already high. Based on the white spots, success factors enabling the levers were deduced. Hence, AM research could significantly benefit from e.g. a stronger interconnection of institutes within the research landscape and a closer integration of companies along the value chain.

These aspects were taken into consideration to develop consistent strategies. The result are ten consistent strategy variants, ranging from a Fundamental Scientist to a Problem Shooter. Contrasting the developed strategies with the strategies the institutes currently pursue, a Strategy Map is resulting (Figure 2). All deduced conclusions are considered for the development of a coherent strategy for the DMRC.